

① Test Specifications Fuel Injection Pumps and Governors

①

WPP 001/4 SAV 5,2 f

En

6. Edition

PES 6 MW 100/320 RS 1009

RQV 300...1400 MW 15 R

Komb. Nr. 0 403 446 113

1 - 5 - 3 - 6 - 2 - 4 = - 60 - 120 - 180 - 240 - 300 ± 0,5 (0,75)°

supersedes

company:

engine

11.80

SAVIEM

MIDR 06.02-12

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

A. Fuel Injection Pump Settings

Port closing at prestroke		3,00 - 3,10 (2,95 - 3,15)		mm (from BDC)	Control rod travel = 9,0 - 12,0 mm		
Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm	
1	2	3	4	2	3	6	
1400	11,6 ^{0,1}	9,4 - 9,6	0,35 (0,6)				
300	6,0 - 6,2	0,95 - 1,35	0,35 (0,55)				
900	See	sect. C!	0,5 (0,7)				
500	"	"	0,35 (0,6)				

Adjust the fuel delivery from each outlet according to the values in

B. Governor Settings

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel ①	
Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm
1	2	3	4	5	6	7	8	9	10	11
ca. 68	1400 1700	15,2 - 17,8 0,0 - 1,0				ca. 12	100	min. 8,0	1440 - 1450	= 8,2
ca. 64	10,7 4,0	1440-1450 1570-1600					300	6,0 - 6,2 480 - 540 = 2,0	380 - 430 300	= 2,5 1,2-1,3

Torque control travel a = mm

C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F) ②		Rotational-speed limitation intermediate speed rev/min	Fuel delivery characteristics high idle speed rev/min	Starting fuel delivery idle switching point rev/min	Torque-control travel Control rod travel mm					
rev/min	cm³/1000 strokes	③	④	⑤	⑥					
1	2	3	4	6	8					
LDA 1400	0,67 bar 94,0 - 96,0 (92,0 - 98,0)	1440-1450*	LDA 900 LDA 500	0,67 bar 84,0 - 88,0 (82,0 - 90,0) 0 bar 63,0 - 65,0 (61,0 - 67,0)	100 300 100 - 230 (80 - 250)	80,0 - 90,0 9,5 - 13,5 (7,0 - 16,0)				

Checking values in brackets

* 1 mm less control rod travel than col. 2

BOSCH

D. Adjustment Test for Manifold Pressure Compensator

Test at n = 500 rev/min decreasing pressure - in bar gauge pressure

Pump/governor	Setting	Measurement	Control rod travel-diminution difference mm (1)
	Gauge pressure = bar	Gauge pressure = bar	
RS 1009/MW 15	0,67	0 0,25	11,6 - 11,7 11,0 - 11,1 11,3 - 11,4

Notes:

(1) when n =

rev/min and gauge pressure =

bar (= maximum full-load control rod travel)

Testoil-ISO 4113

② **Test Specifications**
Fuel Injection Pumps ②
and Governors

WPP 001/4 MB 14,6 g

En

4. Edition

PE 8 P 120 A 320 LS 3807

supersedes

4.83

RQ 30C/1150 PA 546

company:

Daimler-Benz

Komb. Nr. 0 401 848 733

engine

OM 422 A

1 - 8 - 7 - 2 - 6 - 3 - 5 - 4 je $45^\circ \pm 0,5^\circ (\pm 0,75^\circ)$

243 kw (330 PS)

Values only apply to test nozzle-and-holder assembly 1 688 901 019 and fuel-injection test tubing 1 680 750 067.

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

A. Fuel Injection Pump Settings

Port closing at prestroke			4,0 - 4,1 (3,95 - 4,15) mm (from BDC)	Difference cm ³ / 100 strokes	Control rod travel	Fuel delivery	Spring pre-tensioning (torque-control valve)
Rotational speed rev/min	Control rod travel mm	Fuel delivery cm ³ /100 strokes	rev/min	mm	Control rod travel mm	cm ³ /100 strokes	mm
1150	10,7 ^{0,1}	15,6 - 15,8	0,5 (0,9)	0,8 (1,2)			
	5,2 - 5,4	1,2 - 1,8					
	---	C, 4 u. 5	0,7 (1,1)				

Adjust the fuel delivery from each outlet according to the values in **B. Governor Settings**

Checking of slider PRG-check ①		Full-load speed regulation			Idle speed regulation			Torque control	
Setting point	Control rod travel mm	Setting point	Control rod travel mm	Test specifications ④	Setting point	Control rod travel mm	Test specifications ⑤	Control rod travel mm	Control rod travel mm
rev/min	rev/min	rev/min	rev/min	rev/min	rev/min	rev/min	rev/min	rev/min	rev/min
1	2	3	4	5	6	7	8	9	10

Torque-control travel
on flyweight assembly dimension a = 0,2 mmSpeed regulation: At 1200 - 1215 min⁻¹1 mm less control
rod travel**C. Settings for Fuel Injection Pump with Fitted Governor**

Full-loadet delivery on governor control lever		Control rod stop	Fuel delivery characteristics		Starting fuel delivery idle speed	⑥
Test oil temp. 40°C (104°F)	②	③	④	⑤	⑥	Control rod travel
rev/min	cm ³ /1000 strokes	rev/min	rev/min	cm ³ /1000 strokes	rev/min	cm ³ /1000 strokes / mm
1	2	3	4	5	6	7

Checking values in brackets

6.83

BOSCH

D. Adjustment Test for Manifold Pressure Compensator

MB 14,6 g - 2 - En

Test at n = 500 rev/min **decreasing** pressure - in bar gauge pressure
g

Pump/governor	Setting	Measurement	diminution Control rod travel- difference mm (1)
	Gauge pressure = bar	Gauge pressure = bar	
PE 8 P..LS 3807 + ..PA 546	0,47	0 0,40	10,9 - 11,3 10,2 - 10,4 10,3 - 10,6

Notes:

(1) when n =

rev/min and gauge pressure =

bar (= maximum full-load control rod travel)

Testoil-ISO 4113

① Test Specifications Fuel Injection Pumps and Governors

①

WPP 001/4 MB 3,8 a

En

3. Edition

PES 4 A 80 C 410	RS 2094	RQV 300-1425 AB 564 D, 579 D	supersedes	12.74
	RS 2206	RQV 300-1300 AB 564 D	company:	Daimler-Benz
RS 2094,	RS 2244	RQV 300-1000/1425 AB 578 D,	engine	OM 314
	RS 2244 A	RQV 300-1425 AB 623 DL, 624 D		

... D ..

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

A. Fuel Injection Pump Settings

Port closing at prestroke		2,15 - 0,1		mm (from BDC)							
Rotational speed	Control rod travel	Fuel delivery		Difference	Control rod travel	Fuel delivery	Spring pre-tensioning	(torque-control valve)			
rev/min	mm	cm³/100 strokes		cm³/ 100 strokes	mm	cm³/100 strokes	mm				
1000	9	5,5 - 6,0		0,4							
	6	2,2 - 3,0									
	15	11,5 - 12,8									
200	6	1,3 - 2,2									

Adjust the fuel delivery from each outlet according to the values in

B. Governor Settings

RQV 300 - 1425 AB 564 D

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel Torque-control travel	
Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm
1	2	3	4	5	6	7	8	9	10	11
ca. 66	1425	16,0 - 19,3				ca. 10	100	7,0 - 8,0	1425	8,3
	1450	14,6 - 18,2					250	5,5 - 7,0	--	--
	1550	8,2 - 13,3					400	3,5 - 5,2	1400	
	1650	1,3 - 8,0					500	2,5 - 3,7	600	0,35-0,45
	1750	0 - 2,5					600	1,4 - 2,8		
	1800	0					770	0		

Torque control travel a = 0,35 mm

C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation		Fuel delivery characteristics		Starting fuel delivery idle switching point		Intermediate rotational speed Torque-control travel	
rev/min		rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	mm	
1	2	3	4	5	6	7	8	9	
1400	58,0 - 60,0	1460-1470*	1000	51,5 - 54,5	100	7,3 - 8,3			
			800	49,0 - 52,0					
			500	45,5 - 48,5					
(increase by ± 3 cm³)									

Checking values in brackets

* 1 mm less control rod travel than col. 2

BOSCH

Geschaftsbereich KH Kundendienst Kfz-Ausrüstung
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B. Governor Settings

300 - 1000/1425 AB 578 D

MB 3,8 a

- 2 -

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel	
Degree of deflection of control lever	rev/min Control rod travel mm	Control rod travel rev/min	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm
1	2	3	4	5	6	7	8	9	10	11
ca. 68	1400 1450 1500 1550 1660	12,0 - 15,4 8,0 - 12,5 03,4 - 9,6 0 - 6,6 0	ca. 62	1000 1100 1200 1400 1490	12,0 - 14,6 5,2 - 8,2 5,2 - 5,6 1,7 - 4,8 0	ca. 10	200 300 350 400 740	7,8 - 8,0 6,0 - 6,8 5,0 3,2 - 3,9 0	300 800 1130-1350 1400	0,5 - 0,9 4,3 - 4,7 7,4 - 7,6 7,9

Torque control travel a = 0 mm

C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery		Rotational-speed limitation	Fuel delivery characteristics		Starting fuel delivery		Torque-control travel	
Control-rod stop	rev/min	intermediate speed	high idle speed	rev/min	idle switching point	rev/min	Control rod travel mm	
Test oil temp. 40°C (104°F)	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	
rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	
1	2	3	4	5	6	7	8	9
800	47,0 - 49,0	1460-1470*	1400 500	56,5 - 59,5 41,5 - 44,5	100	7,3 - 8,3	700	
(increase by ± 0,5 cm³)								

Checking values in brackets

* 1 mm less control rod travel than col. 2

B. Governor Settings

RQV 300 - 1425 AB 579 D

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel	
Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm
1	2	3	4	5	6	7	8	9	10	11
ca. 66	1425 1450 1550 1650 1800	16,0 - 19,3 14,6 - 18,2 8,2 - 13,3 1,3 - 8,0 0				ca. 10	100 250 400 550 770	7,0 - 8,0 5,5 - 7,0 3,5 - 5,2 2,0 - 3,3 0	1425 --	8,3 --

Torque control travel a = 0 mm

C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery		Rotational-speed limitation	Fuel delivery characteristics		Starting fuel delivery		Torque-control travel	
Control-rod stop	rev/min	intermediate speed	high idle speed	rev/min	idle switching point	rev/min	Control rod travel mm	
Test oil temp. 40°C (104°F)	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	
rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	
1	2	3	4	5	6	7	8	9
800	47,0 - 49,0	1460-1470*	1400 500	56,5 - 59,5 41,5 - 44,5	100	7,3 - 8,3	1300	
(increase by ± 0,5 cm³)								

Checking values in brackets

* 1 mm less control rod travel than col. 2

Testoil-ISO 4113

B. Governor Settings

300 - 1300 AB 564 D MB 3,8 a

- 3 -

Upper rated speed			Intermediate rate 3 speed			Lower rated speed			Sliding sleeve travel Torque-control travel	
Degree of deflection of control lever	rev/min Control rod travel mm	Control rod travel mm rev/min ⑯	Degree of deflection of control lever	rev/min	Control rod travel mm ④	Degree of deflection of control lever	rev/min	Control rod travel mm ③	rev/min	mm ⑮
1	2	3	4	5	6	7	8	9	10	11
ca. 66	1300	15,0 - 17,8				ca. 10	200	5,7 - 7,2	1300	8,3
	1350	10,5 - 14,5					350	3,8 - 5,3	1300	0
	1420	7,7 - 11,1					500	1,9 - 3,2	550	0,25-0,45
	1490	0 - 7,0					640	0 - 1,3		
	1600	0					700	0		

Torque control travel a = 0.35 mm

C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F) rev/min		Rotational-speed limitation intermediate speed rev/min	Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point		Torque-control travel	
	cm³/1000 strokes	(2) (4a)	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	mm
1	2	3	4	5	6	7	8	9
1280	46,5 - 48,5	1320-1330*	1000 500	44,5 - 47,5 36,0 - 39,0	100	7,3 - 8,3		
(increase by + 0,5 cm³)						Change-over point 230 - 300 U/min		

Checking values in brackets

* 1 mm less control rod travel than col. 2

B. Governor Settings

300 - 1425 AB 623 D, .. 624 D

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel		
Degree of deflection of control lever	rev/min Control rod travel mm	Control rod travel mm rev/min ②a	Degree of deflection of control lever	rev/min	Control rod travel mm ④	Degree of deflection of control lever	rev/min	Control rod travel mm ③	rev/min	mm	①
1	2	3	4	5	6	7	8	9	10	11	
ca. 68	1425 1500 1600 1650 1770	16,0 - 19,0 10,8 - 15,3 3,3 - 10,0 0 - 7,4 0				ca. 10	200 300 400 500 770	6,0 - 7,4 4,9 - 6,6 3,5 - 5,1 2,5 - 3,7 0	1425 -- 1400 600	8,3 -- 0 0,35-0,45	

Torque control travel a = 0,35 mm

C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery		Rotational-speed limitation intermediate speed ② rev/min	Fuel delivery characteristics		Starting fuel delivery idle switching point		Torque-control travel	
Control-rod stop	Test oil temp. 40°C (104°F)		high idle speed ④ rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes
1	2	3	4	5	6	7	8	9
1400	58,0 - 60,0	1460-1470*	1000 800 500	51,5 - 54,5 49,0 - 52,0 45,5 - 48,5	100	7,3 - 8,3	623 D = 1300	
					Change-over point 230 - 300 U/min		624 D = 700	
					(increase by ± 0,5 cm³)			

Checking values in brackets

* 1 mm less control rod travel than col. 2

BOSCH

TEST SPECS. IP ASSEMBLY

Pump: PES 6 P 120 A 320 RS 3207
 Regulator: RE 24
 IP-ASSEMBLY: 0 401 996 700

TEST SHEET : VOL 12,2 f
 Edition : 06.93 (4) EN
 Type number : 0 411 826 772
 Type number : 0 421 890 098
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: VOLVO
 Engine: TD 122
 Output kW: 283
 at 1/min:

Min Max

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 064	
Inlet pressure	bar	1.5	1.6
Overflow 1)	l/h	100	120
Calibrating nozzle-holder assembly		1 688 901 019	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 075	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	1000	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure ba	25	27	
Prestroke (from BDC)	mm	3.60	3.70
P Prestroke (from BDC)	mm	3.55	4.75
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

PC mark	Cyl.-No.	-	2)
Pulse wheel position	(PC cam)	°CS	0 3)
Tolerance +/- °CS			0.20
P Tolerance +/- °CS			0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0

Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max. 1.4	

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	700
U/actual	V	3.100
Fuel		
delivery	cm ³ /1000str	248.0 250.0
P Fuel		
delivery	cm ³ /1000str	245.0 253.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	250
U/actual	V	1.240 1.360
Fuel		
delivery	cm ³ /1000str	20.0 26.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

REMARKS

VOLVO-No.:

Dimension "Y"
(Adjustment flange) - -

- 1) = Setting of overflow at full load (refer to measurement point V1)
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump: PES 6 P 120 A 720 RS 7178
 Regulator: RE 30
 IP-ASSEMBLY: 0 402 796 800

TEST SHEET : MAC 12.0 g
 Edition : 06.93 (5) EN
 Type number : 0 412 726 822
 Type number : 0 421 890 009
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MACK
 Engine: E 7 - 400
 Output kW:
 at 1/min:

		Min	Max
PC mark	Cyl.-No.	-	2)
Pulse wheel position	(PC cam)	°CS	0 3)
Tolerance +/- °CS			0.20
P Tolerance +/- °CS			0.75

TEST PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 011	
Inlet pressure	bar	1.9	2.0
Overflow 1)	l/h	160	170
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	6		
Test pressure bar	22	24	
Prestroke (from BDC)	mm	2.75	2.85
P Prestroke (from BDC)	mm	2.70	2.90
Control-rod travel	mm	10.3	10.7
Cam sequence	6 - 2 - 4 - 1 - 5 - 3		
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0

P pos.amplitude V 0.6 3.0

Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max. 1.4	

Continued on next page

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	900
U/actual	V	3.400
Fuel		
delivery	cm ³ /1000str	269.0 271.0
P Fuel		
delivery	cm ³ /1000str	266.0 274.0
Dispersion	cm ³ /1000str	7.0
P Dispersion	cm ³ /1000str	11.0

Test point L1

Speed	1/min	325
U/actual	V	1.290 1.410
Fuel		
delivery	cm ³ /1000str	22.0 28.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

MACK-No.: 313 GC 5183-P6

Dimension "y"
 (Adjustment flange) 15.6 15.9
 (If provided;
 adjustment flange was
 introduced in the course
 of series production)

- 1) = Setting of overflow at full load (refer to measurement point V1).
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.
- 4) = U/actual value min:
 U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump: PE 6 P 120 A 320 RS 3239
 Regulator: RE 24
 IP-ASSEMBLY 0 401 996 701

TEST SHEET : VOL 12,2 g
 Edition : 06.93 (4) EN
 Type number : 0 411 826 785
 Type number : 0 421 890 008
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: VOLVO
 Engine: TD 122 (USA)
 Output kW: 268
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature °C 38 42

Overflow valve 2 417 413 064

Inlet pressure bar 1.5 1.6

Overflow 1) l/h - -

Calibrating nozzle-holder assembly 1 688 901 019

Opening pressure bar 207 210

Perforated plate diameter mm 0.8

Test pressure line 1 680 750 075

Dimensions:

Outer diameter. mm 8.0

x wall thickness mm 2.5

x length mm 1000

TEST SPECIFICATIONS

Section A -

Setting values of injection pump

- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl. 1
 Test pressure bar 25 27

Prestroke (from BDC) mm 2.60 2.70

P Prestroke (from BDC) mm 2.55 2.75

Control-rod travel mm 10.0 11.0

Cam sequence 1 - 5 - 3 - 6 - 2 - 4

PC difference °CS 60 each
 tolerance +/- °CS 0.50

P tolerance +/- °CS 0.75

	Min	Max
PC mark	Cyl.-No. 1 2)	
Pulse wheel position (PC cam)	°CS 0 3)	0.20
Tolerance +/- °CS		0.75
P Tolerance +/- °CS		

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0		
Setting value			
U/actual	V 3.100		
Control-rod travel	mm 12.95 13.05		
P Control-rod travel	mm 12.90 13.10		

Check value

U/actual	V 1.70		
Control-rod travel	mm 5.90 6.40		
P Control-rod travel	mm 5.85 6.45		

Stop position

U/actual	V mind. 4)		
Control-rod travel	mm 0.5 1.0		
P Control-rod travel	mm 0.4 1.1		

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed 1/min 60
 pos.amplitude V 0.8 2.0

P pos.amplitude V 0.6 3.0

Speed 1/min 600
 Difference
 Amplitude to
 Amplitude V max. 1.4

Continued on next page

Min Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	700
U/actual	V	3.380
Fuel		
delivery	cm ³ /1000str	251.0 254.0
P Fuel		
delivery	cm ³ /1000str	248.0 257.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	250
U/actual	V	1.290 1.410
Fuel		
delivery	cm ³ /1000str	23.0 29.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

REMARKS

Dimension "Y"
(Adjustment flange) - -

- 1) = Setting of overflow at full load (refer to measurement point V1).
- 2) = Start of delivery mark at start of delivery of cylinder No 1.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump: PES 6 P 110 A 720 RS 3231
 Regulator: RE 24
 IP-ASSEMBLY 0 402 196 701

TEST SHEET : DEE 10.1 k
 Edition : 06.93 (5) EN
 Type number : 0 412 016 729
 Type number : 0 421 890 006
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: JOHN DEERE
 Engine: 6101 HRW 02 (Tractor)
 Output kW: 224
 at 1/min:

	Min	Max
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Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 057	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		0 681 343 009	
Opening pressure	bar	172	175
Perforated plate diameter	mm	-	-
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	3.35	3.45
P Prestroke (from BDC)	mm	3.30	3.50
Control-rod travel	mm	9.0	12.0
Cam sequence	1 - 5 - 3 - 6 - 2 - 4		
PC difference °CS	60	each	
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No. 1 2)	
Pulse wheel position	(PC cam) °CS	10.5 3)
Tolerance +/- °CS		1.70
P Tolerance +/- °CS		2.25

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0		
Setting value			
U/actual	V 3.100		
Control-rod travel	mm 12.95	13.05	
P Control-rod travel	mm 12.90	13.10	

Check value

U/actual	V 1.700		
Control-rod travel	mm 5.90	6.40	
P Control-rod travel	mm 5.85	6.45	

Stop position

U/actual	V mind. 4)		
Control-rod travel	mm 0.5	1.0	
P Control-rod travel	mm 0.4	1.1	

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min 60		
pos. amplitude	V 0.8	2.0	
P pos. amplitude	V 0.6	3.0	

Speed	1/min 600		
Difference			
Amplitude to			
Amplitude	V max. 1.4		

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1100
U/actual	V	2.706
Fuel		
delivery	cm ³ /1000str	176.0 178.0
P Fuel		
delivery	cm ³ /1000str	173.0 181.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	425
U/actual	V	1.340 1.460
Fuel		
delivery	cm ³ /1000str	13.0 19.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	10.0

REMARKS

Dimension "Y"

(Adjustment flange) - -

- 2) = Port-closing mark 10.5° camshaft after port closing of cylinder 1.
- 3) = Pulse wheel position 10.5° camshaft after port closing of cylinder 1.
- 4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump: PES 6 P 120 A 720 RS 3184
 Regulator: RE 24
 IP-ASSEMBLY: 0 402 196 700

TEST SHEET : DEE 7,7 1
 Edition : 06.93 (4) EN
 Type number : 0 412 026 727
 Type number : 0 421 890 006
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: JOHN DEERE
 Engine: 6.466 A
 Output kW: 161
 at 1/min:

		Min	Max
PC mark	Cyl.-No.	1	2)
Pulse wheel position (PC cam)	°CS	10.5	3)
Tolerance +/- °CS		1.70	
P Tolerance +/- °CS		2.25	

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 057	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	9.0	12.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position			
Speed	1/min	60	
pos. amplitude	V	0.8	2.0
P pos. amplitude	V	0.6	3.0
Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max. 1.4	

Continued on next page

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1100
U/actual	V	2.710
Fuel		
delivery	cm ³ /1000str	140.0 142.0
P Fuel		
delivery	cm ³ /1000str	137.0 145.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	425
U/actual	V	1.340 1.460
Fuel		
delivery	cm ³ /1000str	18.0 24.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	10.0

REMARKS

Dimension "Y"
(Adjustment flange)

- 2) = Port-closing mark 10.5° camshaft after port closing of cylinder 1.
- 3) = Pulse wheel position 10.5° camshaft after port closing of cylinder No. 1.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY
 Pump: PE 8 P 120 A 920/4 LS 7149
 Regulator: RE 30
 IP-ASSEMBLY: 0 402 698 802

TEST SHEET : SCA 14.2 k
 Edition : 06.93 (6) EN
 Type number : 0 412 628 826
 Type number : 0 421 890 007
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: SCANIA
 Engine: DSC 1404
 Output kW: 347
 at 1/min:

	Min	Max
--	-----	-----

Test prerequisites

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 019	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

Test specifications

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

Port closing

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	5.00	5.10
P Prestroke (from BDC)	mm	4.95	5.15
Control-rod travel	mm	9.0	12.0
Cam sequence	1-2-7-3-4-5-6-8		
PC difference °CS	45 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark Cyl.-No.	1	2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, RPM actual = 2.5V

Control-rod pickup setting

Test speed	1/min	0
Setting value		
RPM actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

RPM actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

RPM actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Speed sensor signals

- Test with control rod in stop position

Speed	1/min	60
pos.amplitude	V	0.8 2.0
P pos.amplitude	V	0.6 3.0
- Speed 1/min 600
- Difference
- Amplitude to
- Amplitude V max. 1.4

Continued on next page

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 5))

Test point V1

Speed	1/min	700
RPM actual	V	3.180
Fuel		
delivery	cm ³ /1000str	226.0 228.0
P Fuel		
delivery	cm ³ /1000str	223.0 231.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	225
RPM actual	V	1.540 1.660
Fuel		
delivery	cm ³ /1000str	15.0 21.0
Dispersion	cm ³ /1000str	3.0
P Dispersion	cm ³ /1000str	6.0

REMARKS

SCANIA No.:

Dimension "Y"
(Adjustment flange) 15.6 16.1
(If provided;
adjustment flange was
introduced in the course
of series production)

- 2) = Start of delivery mark at start of delivery of cylinder No 1.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = RPM actual value min.:
RPM actual minimum value with deenergized servo magnet and control rod in shutoff position.

	Min	Max
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REMARKS (Continued)

5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm:
Pump page 2, front.

Delivery-valve holder:

- * Valve spring pre-tension: mm 3.2 3.4
- * Allowed variation: mm 3.0 3.5
- * Required setting for new delivery-valve holders due to flattening: mm 2.9 3.1

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PES 6 P 120 A 720 RS 8007
 Regulator: RE 30
 IP-ASSEMBLY 0 402 996 298

TEST SHEET : MAC 12.0 1
 Edition : 06.93 (4) EN
 Type number : 0 412 926 015
 Type number : 0 421 890 009
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MACK
 Engine: E 7 - 400
 Output kW: --
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 011	
Inlet pressure	bar	-	-
Overflow 1)	l/h	100	110
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING 2)

PC setting cyl.	6		
Test pressure bar	22	24	
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	10.3	10.7
Cam sequence	6 - 2 - 4 - 1 - 5 - 3		
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No. - 3)	
Pulse wheel position (PC cam)	°CS	0 4)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value		
U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

U/actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	5)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position		
Speed	1/min	60
pos.amplitude	V	0.8 2.0
P pos.amplitude	V	0.6 3.0

Speed	1/min	600
Difference		
Amplitude to		
Amplitude	V	max. 1.4

Continued on next page

MAC 12,0 1, page 2, (4) EN

===== Min Max =====

S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	900
U/actual	V	2.930
Fuel		
delivery	cm ³ /1000str	274.0 276.0
P Fuel		
delivery	cm ³ /1000str	271.0 279.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	325
U/actual	V	1.080 1.200
Fuel		
delivery	cm ³ /1000str	22.0 28.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

MACK-No.: 313 GC 5193-P1

Dimension "y"
(Adjustment flange) 15.6 15.9

1) = Setting of overflow at full load (refer to measurement point V1).

2) = Note additional test "Start-of-delivery difference":
Between CRT mm 10.5
and CRT mm 20.0
Difference °CS 0.7 0.8

3) = No start-of-delivery mark.

4) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.

REMARKS (Continued)

5) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY
 Pump : PES 6 P 120 A 720 RS 7204
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 796 802

TEST SHEET : MAC 12.0 k
 Edition : 06.93 (7) EN
 Type number : 0 412 726 836
 Type number : 0 421 890 014
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MACK
 Engine: EM 7 - 250...E 7-350
 Output kW: --
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 011	
Inlet pressure	bar	1.9	2.0
Overflow 1)	l/h	160	170
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	

Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	6		
Test pressure bar	22	24	
Prestroke (from BDC)	mm	3.25	3.35
P Prestroke (from BDC)	mm	3.20	3.40
Control-rod travel	mm	10.3	10.7
Cam sequence 6 - 2 - 4 - 1 - 5 - 3			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark Cyl.-No. - 2)		
Pulse wheel position (PC cam) °CS	0	3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position			
Speed 1/min	60		
pos. amplitude V	0.8	2.0	
P pos. amplitude V	0.6	3.0	
Speed 1/min	600		
Difference			
Amplitude to			
Amplitude V	max. 1.4		

Continued on next page

	Min	Max

Section C -

version 1 5)

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	900	
U/actual	V	3.100	
Fuel			
P Fuel	delivery	cm3/1000str	247.0 249.0
P Dispersion	delivery	cm3/1000str	244.0 252.0
	Dispersion	cm3/1000str	7.0
P Dispersion	Dispersion	cm3/1000str	11.0

Test point L1

Speed	1/min	325	
U/actual	V	1.230 1.350	
Fuel			
P Fuel	delivery	cm3/1000str	22.0 28.0
P Dispersion	Dispersion	cm3/1000str	8.0
P Dispersion	Dispersion	cm3/1000str	12.0

Section C -

version 2 5)

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	900	
U/actual	V	3.100	
Fuel			
P Fuel	delivery	cm3/1000str	244.0 246.0
P Dispersion	delivery	cm3/1000str	241.0 249.0
	Dispersion	cm3/1000str	7.0
P Dispersion	Dispersion	cm3/1000str	11.0

Test point L1

Speed	1/min	325	
U/actual	V	1.230 1.350	
Fuel			
P Fuel	delivery	cm3/1000str	22.0 28.0
P Dispersion	Dispersion	cm3/1000str	8.0
P Dispersion	Dispersion	cm3/1000str	12.0

REMARKS

MACK-No.: 313 GC 5191-P1

Dimension "Y"
 (Adjustment flange) 15.6 15.9
 (If provided;
 adjustment flange was
 introduced in the course
 of series production).

- 1) = Setting of overflow at full load (refer to measurement point V1).
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.
- 4) = U/actual value min:
 U/actual minimum value with deenergized servo magnet and control rod in shutoff position.
- 5) = Test values of version 1 only apply to fuel-injection pumps with constant-pressure valve 2 418 559 013.

Test values of version 2 only apply to fuel-injection pumps with constant-pressure valve 2 418 559 029.

The last three digits of the order number are stamped on the top collar of the constant-pressure valve.

BOSCH TEST SPECS. IP ASSEMBLY
 Pump : PE 6 P 120 A 320 RS 8014
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 896 005

TEST SHEET : VOL 10.3 b
 Edition : 06.93 (3) EN
 Type number : 0 412 826 015
 Type number : 0 421 890 010
 CUSTOMER IDENT. NO.:

=====
 Customer-specific details
 Customer: VOLVO (BUS 8885)
 Engine: THD 103 KB, KF, TD 103 KB, KF
 Output kW: 180, 210
 at 1/min:
 =====

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 064	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -
 Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORt CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	2.95	3.05
P Prestroke (from BDC)	mm	2.90	3.10
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No. -	2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.70	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position
 Speed 1/min 60
 pos. amplitude V 0.8 2.0
 P pos. amplitude V 0.6 3.0
 Speed 1/min 600
 Difference
 Amplitude to
 Amplitude V max. 1.4

Continued on next page

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	650
U/actual	V	2.800
Fuel		
delivery	cm ³ /1000str	295.0 297.0
P Fuel		
delivery	cm ³ /1000str	292.0 300.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	300
U/actual	V	1.340 1.460
Fuel		
delivery	cm ³ /1000str	23.0 29.0
Dispersion	cm ³ /1000str	7.0
P Dispersion	cm ³ /1000str	11.0

REMARKS

VOLVO-No.: 425 100

Dimension "Y"
(Adjustment flange) 15.6 16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel
position at start of delivery
of cylinder No. 1.

4) = U/actual value min.:
U/actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump: PES 6 P 120 A 720 RS 7259
 Regulator: RE 30
 IP-ASSEMBLY 0 402 796 809

TEST SHEET:

Edition: 06.93 (1) EN

Type number: 0 412 726 863

Type number: 0 421 890 014

CUSTOMER IDENT. NO.:

Customer-specific details

Customer: JOHN DEERE
 Engine: 6101 HRW 11
 Output kW: 233
 at 1/min: 2100

	Min	Max
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Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 077	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump

- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING 1)

PC setting cyl.	1		
Test pressure	bar	25	27
Prestroke			
(from BDC)	mm	3.55	3.65
P Prestroke			
(from BDC)	mm	3.50	3.70
Control-rod travel	mm	9.00	12.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference	°CS	60 each	
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
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PC mark	Cyl.-No.	-	2)
Pulse wheel position	(PC cam)	°CS	0 3)
Tolerance +/- °CS			0.20
P Tolerance +/- °CS			0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.70	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0

Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max. 1.4	

Continued on next page

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1050
U/actual	V	2.840
Fuel		
delivery	cm ³ /1000str	212.0 214.0
P Fuel		
delivery	cm ³ /1000str	210.0 216.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	250
U/actual	V	1.530 1.650
Fuel		
delivery	cm ³ /1000str	23.0 29.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	10.0

REMARKS

JOHN DEERE : RE 42 302

Dimension "y"
(Adjustment flange) 15.6 16.1

2) = Flow begin-incipient fissure
8.75 degrees NW after flow
begin cylinder 1.
Incipient fissure over clutch
and indicator.
Incipient fissure measured at
62...68 degrees to vertical
axis of pump.

3) = Setting of pulse-wheel
position at flow begin

4) = U/actual value min:
U/actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PES 6 P 120 A 720 RS 3184
 Regulator : RE 24
 IP-ASSEMBLY: 0 402 196 702

TEST SHEET : DEE 7.7 m
 Edition : 06.93 (2) EN
 Type number : 0 412 026 727
 Type number : 0 421 890 006
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: JOHN DEERE
 Engine: 6076 HH030, HRW30
 Output kW:
 at 1/min:

Min Max

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 057	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	9.0	12.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark Cyl.-No.	1	2)
Pulse wheel position (PC cam)	°CS	10.5 3)
Tolerance +/- °CS		1.70
P Tolerance +/- °CS		2.25

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value		
U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

U/actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60
pos.amplitude	V	0.8 2.0
P pos.amplitude	V	0.6 3.0
Speed	1/min	600
Difference		
Amplitude to		
Amplitude	V	max. 1.4

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1100
U/actual	V	2.710
Fuel		
delivery	cm ³ /1000str	140.0 142.0
P Fuel		
delivery	cm ³ /1000str	137.0 145.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	425
U/actual	V	1.340 1.460
delivery	cm ³ /1000str	18.0 24.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	10.0

REMARKS

Dimension "Y"
(Adjustment flange)

- 2) = Port-closing mark 10.5° cam-shaft after port closing of cylinder 1.
- 3) = Pulse wheel position 10.5° camshaft after port closing of cylinder 1.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PES 6 P 120 A 720 RS 7240
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 796 806

TEST SHEET : UNI 9.5 j
 Edition : 06.93 (2) EN
 Type number : 0 412 726 855
 Type number : 0 421 890 013
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: IVECO - UNIC

Engine: 8460.41.5020

Output kW:

at 1/min:

	Min	Max
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Test prerequisites

Test oil inlet temperature °C 38 42

Overflow valve 2 417 413 025

Inlet pressure bar 1.5 1.6

Overflow 1/h - -

Calibrating nozzle-holder assembly 1 688 901 105

Opening pressure bar 207 210

Perforated plate diameter mm 0.8

Test pressure line 1 680 750 008

Dimensions:
 Outer diameter. mm 6.0
 x wall thickness mm 2.0
 x length mm 600

Test specifications

Section A -

Setting values of injection pump

- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1	
Test pressure bar	25	27
Prestroke (from BDC)	mm	5.10 5.20
P Prestroke (from BDC)	mm	5.05 5.25
Control-rod travel	mm	9.0 12.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4		
PC difference °CS	60 each	
tolerance +/- °CS		0.50
P tolerance +/- °CS		0.75

	Min	Max
PC mark	Cyl.-No. - 2)	
Pulse wheel position (PC cam)	°CS 0 3)	0.20
Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, RPM actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0	
Setting value		
RPM actual	V 3.100	
Control-rod travel	mm 12.95 13.05	
P Control-rod travel	mm 12.90 13.10	

Check value

RPM actual	V 1.700	
Control-rod travel	mm 5.90 6.40	
P Control-rod travel	mm 5.85 6.45	

Stop position

RPM actual	V mind. 4)	
Control-rod travel	mm 0.5 1.0	
P Control-rod travel	mm 0.4 1.1	

SPEED SENSOR SIGNALS

- Test with control rod in stop position		
Speed 1/min 60		
pos.amplitude V 0.8 2.0		
P pos.amplitude V 0.6 3.0		

Speed 1/min 600		
Difference		
Amplitude to		
Amplitude V max. 1.4		

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1050
RPM actual	V	2.900
Fuel		
delivery	cm ³ /1000str	260.0 262.0
P Fuel		
delivery	cm ³ /1000str	257.0 265.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	275
RPM actual	V	1.520 1.640
Fuel		
delivery	cm ³ /1000str	45.0 51.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

Dimension "Y"
(Adjustment flange) 15.6 16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel
position at start of delivery
of cylinder No. 1.

4) = RPM actual value min.:
RPM actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PES 6 P 120 A 720/3 LS 7221
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 796 803

TEST SHEET : MAN 12.0 a
 Edition : 06.93 (2) EN
 Type number : 0 412 726 841
 Type number : 0 421 890 007
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MAN
 Engine: D 2866 LF 10
 Output kW:
 at 1/min:

	Min	Max
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Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING 1)

PC setting cyl.	6		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	4.80	4.90
P Prestroke (from BDC)	mm	4.75	4.95
Control-rod travel	mm	15.0	16.0
Cam sequence 6 - 2 - 4 - 1 - 5 - 3			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark Cyl.-No.	-	2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value		
U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

U/actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60
pos.amplitude	V	0.8 2.0
P pos.amplitude	V	0.6 3.0

Speed	1/min	600
Difference		
Amplitude to		
Amplitude	V	max. 1.4

Continued on next page

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1000
U/actual	V	3.120
Fuel		
delivery	cm ³ /1000str	263.0 265.0
P Fuel		
delivery	cm ³ /1000str	260.0 268.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	300
U/actual	V	1.330 1.450
Fuel		
delivery	cm ³ /1000str	13.0 19.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

MAN-No.: 3-7101

Dimension "y"
(Adjustment flange) 15.6 16.1

- 1) = Note additional test
"Start-of-delivery
difference":
Between CRT mm 4.40 4.60
and CRT mm 15.0 16.0
Difference °CS 1.75 3.25
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel
position at start of delivery
of cylinder No. 6.
- 4) = U/actual value min.:
U/actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump: PES 6 P 120 A 720/3 LS 7221
 Regulator: RE 30
 IP-ASSEMBLY 0 402 796 804

TEST SHEET: MAN 12.0 a 1
 Edition: 06.93 (3) EN
 Type number: 0 412 726 841
 Type number: 0 421 890 012
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MAN
 Engine: D 2866 LF 10
 Output kW:
 at 1/min:

Min Max

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -
 Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING 1)

PC setting cyl.	6		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	4.80	4.90
P Prestroke (from BDC)	mm	4.75	4.95
Control-rod travel	mm	15.0	16.0
Cam sequence	6 - 2 - 4 - 1 - 5 - 3		
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

PC mark	Cyl.-No.	Min	Max
Pulse wheel position (PC cam)	°CS	0	3)
Tolerance +/- °CS		0.20	
P Tolerance +/- °CS		0.75	

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.70	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position
 Speed 1/min 60

pos.amplitude V	0.8	2.0
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P pos.amplitude V	0.6	3.0
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Speed	1/min	600
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Difference		
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Amplitude to		
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Amplitude	V	max. 1.4
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Continued on next page

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1000
U/actual	V	3.120
Fuel		
delivery	cm ³ /1000str	263.0 265.0
P Fuel		
delivery	cm ³ /1000str	260.0 268.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	300
U/actual	V	1.380 1.500
Fuel		
delivery	cm ³ /1000str	13.0 19.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

MAN-NR.: 51.22203-7184

Dimension "Y"
(Adjustment flange) 15.6 16.1

1) = Note additional test
"Start-of-delivery
difference":
Between CRT mm 4.40 4.60
and CRT mm 15.0 16.0
Difference °CS 1.75 3.25

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel
position at start of delivery
of cylinder No. 1.

4) = U/actual value min:
U/actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PE 8 P 120 A 920/4 LS 7205
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 698 804

TEST SHEET : SCA 14.2 o
 Edition : 06.93 (5) EN
 Type number : 0 412 628 845
 Type number : 0 421 890 007
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: SCANIA
 Engine: DSC 1409

Output kW:
 at 1/min:

	Min	Max
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Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 104	
Opening pressure	bar	250	253
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	5.00	5.10
P Prestroke (from BDC)	mm	4.95	5.15
Control-rod travel	mm	10.0	11.0
Cam sequence		1-2-7-3-4-5-6-8	
PC difference °CS		45 each	
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No. 1 2)	
Pulse wheel position (PC cam)	°CS 0 3)	
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, RPM actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0		
Setting value			
RPM actual	V 3.100		
Control-rod travel	mm 12.95	13.05	
P Control-rod travel	mm 12.90	13.10	

Check value

RPM actual	V 1.700		
Control-rod travel	mm 5.90	6.40	
P Control-rod travel	mm 5.85	6.45	

Stop position

RPM actual	V mind. 4)		
Control-rod travel	mm 0.5	1.0	
P Control-rod travel	mm 0.4	1.1	

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min 60		
pos. amplitude	V 0.8	2.0	
P pos. amplitude	V 0.6	3.0	
Speed	1/min 600		
Difference			
Amplitude to			
Amplitude	V max. 1.4		

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 5))

Test point V1

Speed 1/min 700
RPM actual V 3.000

Fuel
delivery cm³/1000str 247.0 249.0
P Fuel
delivery cm³/1000str 244.0 252.0
Dispersion cm³/1000str 8.0
P Dispersion cm³/1000str 12.0

Test point L1

Speed 1/min 250
RPM actual V 1.350 1.470

Fuel
delivery cm³/1000str 10.0 16.0
Dispersion cm³/1000str 4.0
P Dispersion cm³/1000str 8.0

REMARKS

SCANIA-No.: 1 303 800

Dimension "Y"
(Adjustment flange) 15.6 16.1
(If provided;
adjustment flange was
introduced in the course
of series production)

- 2) = Start of delivery mark at start of delivery of cylinder No 1.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = RPM actual value min.:
RPM actual minimum value with deenergized servo magnet and control rod in shutoff position.

REMARKS (Continued)

5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm: Pump page 2, front.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PES 6 P 120 A 720 RS 7235
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 796 805

TEST SHEET : MAC 12.0 n
 Edition : 06.93 (5) EN
 Type number : 0 412 726 847
 Type number : 0 421 890 014
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MACK
 Engine: E 7-350
 Output kW: - -
 at 1/min:

Min Max

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 011	
Inlet pressure	bar	1.9	2.0
Overflow 1)	l/h	160	170
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	6		
Test pressure bar	22	24	
Prestroke (from BDC)	mm	3.25	3.35
P Prestroke (from BDC)	mm	3.20	3.40
Control-rod travel	mm	10.3	10.7
Cam sequence	6 - 2 - 4 - 1 - 5 - 3		
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

PC mark	Cyl.-No.	-	2)
Pulse wheel position	(PC cam)	°CS	0 3)
Tolerance +/- °CS			0.20
P Tolerance +/- °CS			0.75

Section E -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value		
U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

U/actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60
pos.amplitude	V	0.8 2.0
P pos.amplitude	V	0.6 3.0

Speed	1/min	600
Difference		
Amplitude to		
Amplitude	V	max. 1.4

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	900
U/actual	V	3.100
Fuel		
delivery	cm ³ /1000str	244.0 246.0
P Fuel		
delivery	cm ³ /1000str	241.0 249.0
Dispersion	cm ³ /1000str	7.0
P Dispersion	cm ³ /1000str	11.0

Test point L1

Speed	1/min	325
U/actual	V	1.230 1.350
Fuel		
delivery	cm ³ /1000str	22.0 28.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

MACK-No.: 313 GC 5201-P1

Dimension "Y"
(Adjustment flange) 15.6 15.9

- 1) = Setting of overflow at full load (refer to measurement point V1).
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.
- 4) = U/actual value min:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump: PES 6 P 120 A 720 RS 7245
 Regulator: RE 30
 IP-ASSEMBLY: 0 402 796 807

TEST SHEET

: MAC

Edition : 06.93 (5) EN

Type number : 0 412 726 858

Type number : 0 421 890 015

CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MACK
 Engine: E 7 - 350
 Output kW:
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 011	
Inlet pressure	bar	1.9	2.0
Overflow 1)	l/h	160	170
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	6		
Test pressure bar	22	24	
Prestroke (from BDC)	mm	3.25	3.35
P Prestroke (from BDC)	mm	3.20	3.40
Control-rod travel	mm	10.3	10.7
Cam sequence 6 - 2 - 4 - 1 - 5 - 3			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No.	- 2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value		
U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

U/actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position		
Speed	1/min	60
pos. amplitude	V	0.8 2.0
P pos. amplitude	V	0.6 3.0
Speed	1/min	600
Difference		
Amplitude to		
Amplitude	V	max. 1.4

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	900
U/actual	V	3.100
Fuel		
delivery	cm ³ /1000str	244.0 246.0
P Fuel		
delivery	cm ³ /1000str	241.0 249.0
Dispersion	cm ³ /1000str	7.0
P Dispersion	cm ³ /1000str	11.0

Test point L1

Speed	1/min	325
U/actual	V	1.230 1.350
Fuel		
delivery	cm ³ /1000str	22.0 28.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

MACK-No.: 313 GC 5204-P1

Dimension "Y"

(Adjustment flange) 15.6 15.9
 (If provided;
 adjustment flange was
 introduced in the course
 of series production)

- 1) = Setting of overflow at full load (refer to measurement point V1).
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.
- 4) = U/actual value min:
 U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump: PES 6 P 120 A 720/3 LS 7252
 Regulator: RE 30
 IP-ASSEMBLY 0 402 796 808

TEST SHEET:

MAN

Edition: 06.93 (2) EN
 Type number: 0 412 726 861
 Type number: 0 421 890 012
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MAN
 Engine: D 2866 LF 10
 Output kW: 309
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING 1)

PC setting cyl.	6		
Test pressure	bar	25	27
Prestroke			
(from BDC)	mm	4.80	4.90
P Prestroke			
(from BDC)	mm	4.75	4.95
Control-rod travel	mm	15.0	16.0
Cam sequence	6 - 2 - 4 - 1 - 5 - 3		
PC difference	°CS	60 each	
	tolerance +/- °CS	0.50	
P	tolerance +/- °CS	0.75	

	Min	Max
PC mark	Cyl.-No.	- 2)
Pulse wheel position	(PC cam)	°CS 0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value		
U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

U/actual	V	1.70
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position		
Speed	1/min	60
pos. amplitude	V	0.8 2.0
P pos. amplitude	V	0.6 3.0
Speed	1/min	600
Difference		
Amplitude to		
Amplitude	V	max. 1.4

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1000
U/actual	V	3.120
Fuel		
delivery	cm ³ /1000str	263.0 265.0
P Fuel		
delivery	cm ³ /1000str	260.0 268.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	300
U/actual	V	1.380 1.500
Fuel		
delivery	cm ³ /1000str	13.0 19.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

MAN-NR.: 51.22203-7210

Dimension "Y"
(Adjustment flange) 15.6 16.1

- 1) = Note additional test
"Start-of-delivery
difference":
Between CRT mm 6.40 6.60
and CRT mm 15.0 16.0
Difference °CS 1.75 3.25
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel
position at start of delivery
of cylinder No. 6.
- 4) = U/actual value min:
U/actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : Audi
 Date of manufacture :
 Edition : 30.04.1992
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE5/11E2300L400

 Type No. : 0 460 415 998
 Customer Ident.No. :

 Customer-specific details
 Customer : Audi

 Engine : 180-02-TDI-C4

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0,30...0,40

 Calibrating nozzle-holder assembly > : 1 688 901 114

 Opening pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6,00
 x wall thickness > : 2,20
 x length > mm : 350

 Overflow valve : 2 467 413 006

 Test line : 0 986 612 432
 (fuel-delivery actuator) : (KDEP 1865/3)

 Test line : 0 986 612 435
 (solenoid valve start of injection) : (KDEP 1865/6)

TEST PRECONDITIONS

Test oil
 return temp. > °C
 with thermometer : 55

 Test oil supply
 temperature > °C : 42...47

Hold-up
 revolutions >1/min : 1200
 Feedback
 voltage mV : 2500

Actuator
 Connections 4 and 7
 Test temperature:
 15°...30°C, ohms : 0,4...1,0
 50°...70°C, ohms : 0,45...1,1

Connections 4 and ground, Mohms min. : 1,0
 Connections 7 and ground, Mohms min. : 1,0
 Connections 2 and 7 Mohms min. : 1,0
 Connections 4 and 6 Mohms min. : 1,0

Control-collar travel sensor
 Test temperature :
 15°...70°C
 Connections 2 and 3 kohms : 1,0...3,0
 Connections 1 and 3 kohms : 0,5...2,0

Connections 1 and ground, Mohms min. : 1,0
 Connections 2 and ground, Mohms min. : 1,0
 Connections 3 and ground, Mohms min. : 1,0

Temperature sensor, fuel
 Connentions 5 and 6
 Test temperature:
 15°...30°C, kohms : 1,2...4,0
 50°...70°C, kohms : 0,3...1,2

Connections 5 and ground, Mohms min. : 1,0
 Connections 6 and ground Mohms min. : 1,0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14,3...17,3
 50°...70°C, ohms : 15,5...21,0

Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 750

Checkbk. volt.

mV : 3900

Setting value, bar : 6,2...7,2

Timing device travel:

Speed 1/min : 750

Checkbk. volt

mV : 3900

Setting value, mm : 9,70...9,90

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2125

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2440

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 39,3...39,7

Dispersion cm³/ : 2,5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2125

Checkbk. volt

mV : 3900

Supply pump pressure > bar : 8,1...9,1

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 3900

Timing device

travel mm : 7,8...10,2
> mm : (7,5...11,5)

2nd speed 1/min : 750

Checkbk. volt. mV : 3900

Timing device

travel mm :
> mm : (9,4...11,2)

3rd speed 1/min : 1000

Checkbk. volt. mV : 1800

Timing device

travel mm : max. 0,3
> mm : (max. 1,0)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 2125

Checkbk. volt. mV : 3900

Timing device

travel mm : 11,6...12,6
> mm : (11,5...12,7)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2125

Checkbk. volt. mV : 3900

Measuring

temperature °C : 53

Overflow : 40...60

> cm³/10 : (35...65)

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt mV : 3900
Meßtemperatur °C : 53
Fuel delivery cm³/ : 54,2...56,8
> 1000s : (53,0...58,0)
Dispersion cm³/ : 3,0
> 1000s. : (5,0)

2nd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3200
Measuring
temperature °C : 56
Fuel delivery cm³/ : 55,7...58,3
> 1000s : (54,5...59,5)
Dispersion cm³/ : 2,5
> 1000s : (4,0)

3rd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2440
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37,5...41,5)
Dispersion cm³/ :
> 1000s :

4th temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2300
Measuring
temperature °C : 57
Fuel delivery cm³/ : 40,2...42,8
> 1000s : (39,2...43,8)
Dispersion cm³/ : 3,0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1570
Meßtemperatur °C : 57
Fuel delivery cm³/ : 7,2...12,2
> 1000s : (5,2...14,2)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3,5
> 1000s : (5,0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2900
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 74,0
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1100
Checkbk. volt mV : 4125
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3,0
Start of
injection, volts : 12

Shutoff solenoid:

Cut-in voltage
min.> volts : 10,0
Rated voltage,
volts : 12,0

Notes:

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	: 2.7...2.9
KF	mm	: 6,5...6,9
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 494

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture :
 Edition : 30.04.1992
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE4/10E2250R440

 Type No. : 0 460 404 993
 Customer Ident.No. :

 Customer-specific details
 Customer : VW

 Engine : 028.C

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

 Calibrating nozzle-holder assembly > : 1 688 901 114

 Opening pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 006

 Test line : 0 986 612 432
 (fuel-delivery actuator) : (KDEP 1865/3)

 Test line : 0 986 611 983
 (solenoid valve : (KDEP 1190)
 start of injection)

TEST PRECONDITIONS

Test oil
 return temp. > °C
 with thermometer : 55

 Test oil supply
 temperature > °C : 42...47

Hold-up
 revolutions >1/min : 1200
 Feedback
 voltage mV : 2500

Actuator
 Connections 4 and 7
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground, Mohms min. : 1.0
 Connections 2 and 7 Mohms min. : 1.0
 Connections 4 and 6 Mohms min. : 1.0

 Control-collar travel sensor
 Test temperature :
 15°...70°C
 Connections 2 and 3 kohms : 1.0...3.0
 Connections 1 and 3 kohms : 0.5...2.0

Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

 Temperature sensor, fuel
 Connentions 5 and 6
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

 Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground Mohms min. : 1.0

 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2245

Setting value, bar : 6.5...7.1

Timing device travel:

Speed 1/min : 750

Checkbk. volt

mV : 3350

Setting value, mm : 10.7...10.9

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2480

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 38.8...39.2

Dispersion cm³/ : 4.0

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000

Checkbk. volt

mV : 3890

Supply pump

pressure > bar : 9.0...9.6

> bar :

1st speed 1/min : 150

Checkbk. volt

mV : 2230

Supply pump

pressure > bar :

> bar : min. 3.5

Timing device variations:

1st speed 1/min : 500

Checkbk. volt.

mV : 2245

Timing device

travel mm : 9.3...11.7

> mm : (8.0...13.0)

2nd speed 1/min : 750

Checkbk. volt.

mV : 3350

Timing device

travel mm :

> mm : (9.9...11.7)

3rd speed 1/min : 1000

Checkbk. volt.

mV : 1475

Timing device

travel mm : max. 0.3

> mm : (max. 0.5)

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 1400

Checkbk. volt.

mV : 1475

Timing device

travel mm :

> mm : (max. 1.0)

Start of

injection, volts : 12

5.th speed 1/min : 2000

Checkbk. volt.

mV : 3890

Timing device

travel mm : 11.6...12.8

> mm : (11.4...13.0)

6.th speed 1/min : 150

Checkbk. volt.

mV : 2230

Timing device

travel mm : 2.0...7.0

> mm : (min. 1.5)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt.

mV : 2500

Output

temperature °C : 51

Speed 1/min : 2000

Checkbk. volt.

mV : 3890

Measuring

temperature °C : 53

Overflow : 40...60

> cm³/10 : (35...65)

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt
mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt
mV : 3890
Measuring
temperature °C : 53
Fuel delivery cm³/ : 47.7...50.3
> 1000s : (46.5...51.5)
Dispersion cm³/ : 4.0
> 1000s. : (5.0)

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt
mV : 2860
Measuring
temperature °C : 56
Fuel delivery cm³/ : 41.6...44.2
> 1000s : (40.4...45.4)
Dispersion cm³/ : 3.0
> 1000s : (4.0)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.0...41.0)
Dispersion cm³/ :
> 1000s : (5.0)
4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt
mV : 2245
Measuring
temperature °C : 57
Fuel delivery cm³/ : 36.7...39.3
> 1000s : (35.7...40.3)
Dispersion cm³/ : 4.0
> 1000s : (5.0)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1600
Measuring
temperature °C : 57
Fuel delivery cm³/ : 10.2...15.2
> 1000s : (9.2...16.2)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s : (5.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2230
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 31.0
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 750
Checkbk. volt mV : 2480
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 8.0

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 5,8...6,2
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 376

BOSCH INJECTION PUMP TEST SPECIFICATIONS		ELECTRICAL TEST
Observe notes in remark column		Actuator
Test sheet	: Audi	Connections 4 and 7
Date of manufacture:		Test temperature: 15°...30°C, ohms : 0,4...1,0
Edition	: 13.04.1992	50°...70°C, ohms : 0,45...1,1
Replaces	:	Connections 4 and.
Test oil	: ISO 4113	ground, Mohms min. : 1,0
Injection pump	: VE5/11E2400L323	Connections 7 and
Type No.	: 0 460 415 999	ground, Mohms min. : 1,0
Customer Ident.No.:		Connections 2 and 7
Customer-specific details		Mohms min. : 1,0
Customer	: Audi	Connections 4 and 6
Engine	: 180-02-TDI-C3	Mohms min. : 1,0
Output kW :		Control-collar travel sensor
Speed 1/min :		Test temperature :
TEST BENCH PREREQUISITES		15°...70°C
Inlet pressure, bar:	0,30...0,40	Connections 2 and 3
Calibrating nozzle-holder assembly > :	1 688 901 114	kohms : 1,0...3,0
Opening pressure > bar :	207...210	Connections 1 and 3
Test pressure line :	1 680 750 085	kohms : 0,5...2,0
Outer diameter : 6.00		Connections 1 and.
x wall thickness > : 2.20		ground, Mohms min. : 1,0
x length > mm : 350		Connections 2 and
Overflow valve :	2 467 413 006	ground, Mohms min. : 1,0
Test line : KDEP 1865/3 (fuel-delivery actuator)		Connections 3 and
Test line : KDEP 1865/6 (solenoid valve start of injection)		ground, Mohms min. : 1,0
TEST PRECONDITIONS		Temperature sensor, fuel
Test oil return temp. > °C		Connections 5 and 6
with thermometer :	55	Test temperature: 15°...30°C, kohms : 1,2...4,0
Test oil supply temperature > °C :	42...47	50°...70°C, kohms : 0,3...1,2
Hold-up revolutions >1/min :	1200	Connections 5 and
Feedback voltage mV :	2500	ground, Mohms min. : 1,0
		Connections 6 and
		ground Mohms min. : 1,0
		Solenoid valve, start of injection
		Connections 1 and 2
		Test temperature :
		15°...30°C, ohms : 14,3...17,3
		50°...70°C, ohms : 15,5...21,0
		Starting stop mV : 4120...4650
		Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 1000

Checkbk. volt.

mV : 3300

Setting value, bar : 7,1...8,1

Timing device travel:

Speed 1/min : 1000

Checkbk. volt

mV : 3300

Setting value, mm : 10,4...10,6

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2125

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2740

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 38,3...38,7

Dispersion cm³/ : 2,5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2125

Checkbk. volt

mV : 3900

Supply pump

pressure > bar : 8,9...9,9

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2500

Timing device

travel mm : 7,8...10,2
> mm : (6,7...11,3)

2nd speed 1/min : 1000

Checkbk. volt. mV : 3300

Timing device

travel mm :
> mm : (9,6...11,4)

3rd speed 1/min : 1000

Checkbk. volt. mV : 1800

Timing device

travel mm : max. 0,3
> mm : (max. 1,0)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 2125

Checkbk. volt. mV : 3900

Timing device

travel mm : 10,2...11,8
> mm : (9,5...12,5)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2125

Checkbk. volt. mV : 3900

Measuring

temperature °C : 53

Overflow : 40...60

> cm³/10 : (35...65)

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt mV : 3900
Measuring
temperature °C : 53
Fuel delivery cm³/ : 46,4...49,0
> 1000s : (45,2...50,2)
Dispersion cm³/ : 3,0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3300
Measuring
temperature °C : 56
Fuel delivery cm³/ : 47,5...50,1
> 1000s : (46,3...51,3)
Dispersion cm³/ : 2,5
> 1000s : (4,0)

3rd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2740
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (36,5...40,5)

4th temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2500
Measuring
temperature °C : 57
Fuel delivery cm³/ : 35,5...38,1
> 1000s : (34,5...39,1)
Dispersion cm³/ : 3,0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 400
Checkbk. volt mV : 2000
Measuring
temperature °C : 61
Fuel delivery cm³/ : 6,5...11,5
> 1000s : (4,5...13,5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 5,0
> 1000s : (6,0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 3500
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 73,0
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1100
Checkbk. volt mV : 4125
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3,0
Start of
injection, volts : 12

Shutoff solenoid:

Cut-in voltage
min. > volts : 10,0
Rated voltage,
volts : 12,0

Notes:

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting: Description

K	mm	:
KF	mm	: 6,5...6,9
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 494

BOSCH TEST SPECS. IP ASSEMBLY

Pump: PES 5 P 120 A 720/3 LS 7250
 Regulator: RE 30
 IP-ASSEMBLY 0 402 795 800

TEST SHEET: MAN
 Edition: 06.93 (2) EN
 Type number: 0 412 725 810
 Type number: 0 421 890 012
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MAN
 Engine: D 2865 LF 10
 Output kW:
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING 1)

PC setting cyl.	5		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	4.80	4.90
P Prestroke (from BDC)	mm	4.75	4.95
Control-rod travel	mm	15.0	16.0
Cam sequence	1 - 3 - 5 - 4 - 2		
PC difference °CS	0-72-144-216-288		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No. -	2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0	
Setting value		
U/actual	V 3.100	
Control-rod travel	mm 12.95	13.05
P Control-rod travel	mm 12.90	13.10

Check value

U/actual	V 1.70	
Control-rod travel	mm 5.90	6.40
P Control-rod travel	mm 5.85	6.45

Stop position

U/actual	V mind. 4)	
Control-rod travel	mm 0.5	1.0
P Control-rod travel	mm 0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min 60	
pos. amplitude	V 0.8	2.0
P pos. amplitude	V 0.6	3.0

Speed	1/min 600	
Difference		
Amplitude to		
Amplitude	V max. 1.4	

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1000
U/actual	V	3.120
Fuel		
delivery	cm ³ /1000str	263.0 265.0
P Fuel		
delivery	cm ³ /1000str	260.0 268.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	325
U/actual	V	1.410 1.530
Fuel		
delivery	cm ³ /1000str	27.0 33.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

MAN-NR.: 51.11103-7233

Dimension "Y"
(Adjustment flange) 15.6 16.1

- 1) = Note additional test
"Start-of-delivery
difference":
Between CRT mm 6.40 6.60
and CRT mm 15.0 16.0
Difference °CS 1.75 3.25
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel
position at start of delivery
of cylinder No. 5.
- 4) = U/actual value min:
U/actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

BOSCH TEST SPECS. IP ASSEMBLY
 Pump : PES 6 P 120 A 720 RS 8501
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 996 301

TEST SHEET : MAC
 Edition : 11.93 (3) EN
 Type number : 0 412 926 201
 Type number : 0 421 890 015
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MACK
 Engine: EM 7 - 350
 Output kW: --
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 084	
Inlet pressure	bar	2.4	2.6
Overflow 1)	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	6		
Test pressure bar	22	24	
Prestroke (from BDC)	mm	4.55	4.65
P Prestroke (from BDC)	mm	4.50	4.70
Control-rod travel	mm	11.8	12.2
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.30	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No.	- 3)
Pulse wheel position (PC cam)	°CS	0 4)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	5)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max.	1.4

Continued on next page

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	900
U/actual	V	3.050
Fuel		
delivery	cm ³ /1000str	309.0 311.0
P Fuel		
delivery	cm ³ /1000str	305.0 315.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	14,0
Speed	1/min	325
U/actual	V	1.250 1.370
Fuel		
delivery	cm ³ /1000str	30.0 36.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

MACK-No.: 313 GC 5205-P1

Dimension "y"
(Adjustment flange) 15.6 15.9

- 1) = Setting of overflow at full load (refer to measurement point V1).
- 3) = No start-of-delivery mark.
- 4) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 5) = U/actual value min:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH INJECTION PUMP TEST SPECIFICATIONS		ELECTRICAL TEST
Observe notes in remark column		Actuator
Test sheet	: BMW	Connections 4 and 7
Date of manufacture:		Test temperature: 15°...30°C, ohms : 0.4...1.0
Edition	: 19.10.1992	50°...70°C, ohms : 0.45...1.1
Replaces	:	Connections 4 and.
Test oil	: ISO 4113	ground, Mohms min. : 1.0
Injection pump	: VE6/10E2400R300-1	Connections 7 and
Type No.	: 0 460 406 995	ground, Mohms min. : 1.0
Customer Ident.No.:		Connections 2 and 7
Customer-specific details		Mohms min. : 1.0
Customer	: BMW	Connections 4 and 6
Engine	: M51	Mohms min. : 1.0
Output kW :		Control-collar travel sensor
Speed 1/min :		Test temperature :
TEST BENCH PREREQUISITES		15°...70°C
Inlet pressure, bar:	0.30...0.40	Connections 2 and 3
Calibrating nozzle-holder assembly > :	1 688 901 022	kohms : 1.0...3.0
Opening pressure > bar :	130...133	Connections 1 and 3
Test pressure line :	1 680 750 073	kohms : 0.5...2.0
Outer diameter :	6.00	Connections 1 and.
x wall thickness > :	2.00	ground, Mohms min. : 1.0
x length > mm :	450	Connections 2 and
Test line (fuel-delivery actuator)	: 0 986 612 430 : (KDEP 1865/1)	ground, Mohms min. : 1.0
Test line (solenoid valve start of injection):	: 0 986 612 435 : (KDEP 1865/6)	Connections 3 and
		ground, Mohms min. : 1.0
		Temperature sensor, fuel
		Connentions 5 and 6
		Test temperature:
		15°...30°C, kohms : 1.2...4.0
		50°...70°C, kohms : 0.3...1.2
		Connections 5 and
		ground, Mohms min. : 1.0
		Connections 6 and
		ground Mohms min. : 1.0
		Solenoid valve, start of injection
		Connections 1 and 2
		Test temperature :
		15°...30°C, ohms : 14.3...17.3
		50°...70°C, ohms : 15.5...21.0
		Starting stop mV : 4120...4650
		Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 1500

Checkbk. volt.

mV : 3000

Setting value, bar : 7.2...7.8

Timing device travel:

Speed 1/min : 1500

Checkbk. volt

mV : 3000

Setting value, mm : 8.4...8.8

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 1500

Checkbk. volt

mV . : 3000

Fuel delivery cm³/

> 1000s : 44.5...44.9

Dispersion cm³/ : 2.0

> 1000s :

Test specifications of injection pump

Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2400

Checkbk. volt

mV : 3000

Supply pump

pressure > bar : 8.5...9.5

> bar :

2st speed 1/min : 350

Checkbk. volt

mV : 3850

Supply pump

pressure > bar : 5.4...6.3

> bar :

Timing device variations:

1st speed 1/min : 350

Checkbk. volt. mV : 3850

Timing device

travel mm : 4.8...6.2
> mm : (4.5...6.5)

2nd speed 1/min : 1500

Checkbk. volt. mV : 3000

Timing device

travel mm :
> mm : (7.9...9.3)

3rd speed 1/min : 1500

Checkbk. volt. mV : 3000

Timing device

travel mm : 0.0...0.2
> mm :

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 2300

Checkbk. volt. mV : 3000

Timing device

travel mm : 9.5...10.1
> mm : (9.3...10.3)

5.th speed 1/min : 150

Checkbk. volt. mV : 3850

Timing device

travel mm : 1.3...4.7
> mm : (1.0...5.0)

Overflow at overflow valve:

Speed 1/min : 2400

Checkbk. volt. mV : 3000

Overflow : 69...180

> cm³/10 :

Fuel delivery variations:

1. Speed 1/min : 2400
Checkbk. volt mV : 3000
Fuel delivery cm³/ : 45.0...47.0
> 1000s : (43.5...48.5)
Dispersion cm³/ : 2.5
> 1000s. : (2.5)

2. Speed 1/min : 1500
Checkbk. volt mV : 3000
Fuel delivery cm³/ :
> 1000s : (42.9...46.5)
Dispersion cm³/ :
> 1000s : (2.0)

3. Speed 1/min : 1000
Checkbk. volt mV : 3100
Fuel delivery cm³/ : 46.0...48.0
> 1000s : (44.5...49.5)
Dispersion cm³/ : 2.0
> 1000s : (2.0)

4. Speed 1/min : 1000
Checkbk. volt mV : 2350
Fuel delivery cm³/ : 13.6...14.8
> 1000s : (11.9...16.5)
Dispersion cm³/ : 2.0
> 1000s : (2.0)

4. Speed 1/min : 5000
Checkbk. volt mV : 3000
Fuel delivery cm³/ : 30.9...32.9
> 1000s : (29.4...34.4)
Dispersion cm³/ : 2.0
> 1000s : (2.0)

Idle delivery:

Speed 1/min : 350
Checkbk. volt mV : 2600
Fuel delivery cm³/ : 7.4...9.4
> 1000s : (5.9...10.9)

Solenoid valve

Start of injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s : (2.0)

Starting fuel delivery:

Speed 1/min : 100
Checkbk. volt mV : 3680
Fuel delivery cm³/ :
> 1000s : 33.0

Solenoid valve

Start of injection, volts : 12

Stop test:

Speed 1/min : 2400
Checkbk. volt mV : 3000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : Audi
 Date of manufacture :
 Edition : 01.06.1993
 Replaces :
 Test oil : ISO 4113

Injection pump : VE5/11E2300L460

Type No. : 0 460 415 997
 Customer Ident. No. :

Customer-specific details
 Customer : Audi

Engine : 180-02-TDI-C4

Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0,30...0,40

Calibrating nozzle-holder assembly > : 1 688 901 114

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6,00
 x wall thickness > : 2,20
 x length > mm : 350

Overflow valve : 2 467 413 009

Test line : 0 986 612 440
 (fuel-delivery actuator) : (KDEP 1865/11)

Test line : 0 986 612 435
 (solenoid valve start of injection) : (KDEP 1865/6)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer : 55

Test oil supply temperature > °C : 42...47

Hold-up revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator

Connections 4 and 7

Test temperature:

15°...30°C, ohms : 0,4...1,0

50°...70°C, ohms : 0,45...1,1

Connections 4 and ground, Mohms min. : 1,0
 Connections 7 and ground, Mohms min. : 1,0
 Connections 2 and 7 Mohms min. : 1,0
 Connections 4 and 6 Mohms min. : 1,0

High-pressure compressor sensor

Sensor coils

Connections 1 and 3

Ohms : 4,9...6,5

Connections 2 and 3

Ohms : 4,9...6,5

Connections 1 and 2

Ohms : 9,8...13,0

Connections 1 and ground, Mohms min. : 1,0
 Connections 2 and ground, Mohms min. : 1,0
 Connections 3 and ground, Mohms min. : 1,0

Temperature sensor, fuel Connentions 5 and 6

Test temperature:

15°...30°C, kohms : 1,2...4,0

50°...70°C, kohms : 0,3...1,2

Connections 5 and ground, Mohms min. : 1,0
 Connections 6 and ground Mohms min. : 1,0

Solenoid valve, start of injection

Connections 1 and 2

Test temperature :

15°...30°C, ohms : 14,3...17,3

50°...70°C, ohms : 15,5...21,0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 750

Checkbk. volt.

mV : 3900

Setting value, bar : 6,0...7,0

Timing device travel:

Speed 1/min : 750

Checkbk. volt

mV : 3900

Setting value, mm : 9,30...9,50

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2125

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2460

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 39,6...40,0

Dispersion cm³/ : 2,5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2125

Checkbk. volt

mV : 3900

Supply pump

pressure > bar : 7,9...8,9

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 3900

Timing device

travel mm : 7,5...9,9
> mm : (7,2...10,2)

2nd speed 1/min : 750

Checkbk. volt. mV : 3900

Timing device

travel mm :
> mm : (7,5...11,3)

3rd speed 1/min : 1200

Checkbk. volt. mV : 1800

Timing device

travel mm : max. 0,3
> mm : (max. 1,0)

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 2125

Checkbk. volt. mV : 3900

Timing device

travel mm : 11,6...12,6
> mm : (11,5...12,7)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2125

Checkbk. volt. mV : 3900

Measuring

temperature °C : 53

Overflow : 110...165

> cm³/10 : (97...180)

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt mV : 3900
Meßtemperatur °C : 53
Fuel delivery cm³/ : 54,3...56,9
> 1000s : (53,6...57,6)
Dispersion cm³/ : 3,0
> 1000s. :

2nd temperature-conditioning

revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3210
Measuring
temperature °C : 56
Fuel delivery cm³/ : 55,7...58,3
> 1000s : (55,0...59,0)
Dispersion cm³/ : 2,0
> 1000s : (2,5)

3rd temperature-conditioning

revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2460
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (38,5...41,1)
Dispersion cm³/ :
> 1000s :

4th temperature-conditioning

revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2320
Measuring
temperature °C : 57
Fuel delivery cm³/ : 40,8...43,4
> 1000s : (40,1...44,1)
Dispersion cm³/ : 3,0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1520
Meßtemperatur °C : 57
Fuel delivery cm³/ : 8,1...12,1
> 1000s : (7,1...13,1)

Solenoid valve

Start of
injection, volts : 12
Dispersion cm³/ : 3,0
> 1000s : (4,0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 65

Speed 1/min : 100
Checkbk. volt mV : 2960
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 72,3

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 1100
Checkbk. volt mV : 4125
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3,0

Start of
injection, volts : 12

Shutoff solenoid:

Cut-in voltage
min.> volts : 10,0
Rated voltage,
volts : 12,0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	: 2.7...2.9
KF	mm	:
SVS max.	mm	:
FH	mm	:

BOSCH INJECTION PUMP TEST SPECIFICATIONS		ELECTRICAL TEST
Observe notes in remark column		Actuator
Test sheet	: Alfa	Connections 4 and 7
Date of manufacture:		Test temperature: 15°...30°C, ohms : 0.4...1.0
Edition	: 19.10.1992	50°...70°C, ohms : 0.45...1.1
Replaces	:	Connections 4 and.
Test oil	: ISO 4113	ground, Mohms min. : 1.0
Injection pump	: VE4/10E2100L450	Connections 7 and
Type No.	: 0 460 404 997	ground, Mohms min. : 1.0
Customer Ident.No.:		Connections 2 and 7
Customer-specific details		Mohms min. : 1.0
Customer	: Motori VM	Connections 4 and 6
Engine	: 425 CHIEA	Mohms min. : 1.0
Output kW	:	Control-collar travel sensor
Speed 1/min	: 2200	Test temperature :
TEST BENCH PREREQUISITES		15°...70°C
Inlet pressure, bar	: 0.30...0.40	Connections 2 and 3
Calibrating nozzle-holder assembly >	: 1 688 901 022	kohms : 1.0...3.0
Opening pressure >	bar : 130...133	Connections 1 and 3
Test pressure line	: 1 680 750 073	kohms : 0.5...2.0
Outer diameter	: 6.00	Connections 1 and.
x wall thickness >	: 2.00	ground, Mohms min. : 1.0
x length > mm	: 450	Connections 2 and
Overflow valve	: 2 467 413 009	ground, Mohms min. : 1.0
Test line	: 0 986 612 434	Connections 3 and
(fuel-delivery actuator)	: (KDEP 1865/5)	ground, Mohms min. : 1.0
Test line	: 0 986 612 435	Solenoid valve, start of injection
(solenoid valve : (KDEP 1865/6)		Connections 1 and 2
start of injection)		Test temperature :
TEST PRECONDITIONS		15°...30°C, ohms : 14.3...17.3
Test oil return temp. > °C		50°...70°C, ohms : 15.5...21.0
with thermometer	: 45	Starting stop mV : 4120...4650
Test oil supply temperature > °C	: 35...40	Shutoff stop mV : 650...850
Hold-up revolutions >1/min	: 1100	
Feedback voltage mV	: 2500	

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2700
Setting value, bar : 6.1...6.7

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2700
Setting value, mm : 8.10...8.50

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt
mV : 2500
Output
temperature °C : 42
Speed 1/min : 1250
Checkbk. volt
mV : 2000
Measuring
temperature °C : 44
Fuel delivery cm³/
> 1000s : 30.0...30.4
Dispersion cm³/ : 2.0
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100
Checkbk. volt
mV : 2700
Supply pump
pressure > bar : 8.2...9.2
> bar :

2st speed 1/min : 150
Checkbk. volt
mV : 2900
Supply pump
pressure > bar : 3.5...5.5
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2700
Timing device
travel mm :
> mm : (7.6...9.0)

2nd speed 1/min : 1000
Checkbk. volt. mV : 2700
Timing device
travel mm : 9.1...9.7
> mm : (8.7...10.1)

3rd speed 1/min : 1000
Checkbk. volt. mV : 1550
Timing device
travel mm : max. 0.5
> mm :

Solenoid valve
Start of
injection, volts : 12

4th speed 1/min : 2100
Checkbk. volt. mV : 2700
Timing device
travel mm : 9.5...10.1
> mm : (9.4...10.2)

5th speed 1/min : 2100
Checkbk. volt. mV : 1450
Timing device
travel mm : max. 1.0
> mm :

Solenoid valve
Start of
injection, volts : 12

6th speed 1/min : 150
Checkbk. volt. mV : 2900
Timing device
travel mm : 3.0...6.0
> mm : (2.0...7.0)

Solenoid valve

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 41
Speed 1/min : 2100
Checkbk. volt. mV : 2700
Measuring
temperature °C : 43
Overflow cm³/10s : 55...165

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 41
Speed 1/min : 2100
Checkbk. volt mV : 2700
Meßtemperatur °C : 43
Fuel delivery cm³/ : 64.0...67.0
> 1000s : (63.0...68.0)
Dispersion cm³/ : 2.0
> 1000s. : (2.5)

2nd temperature-conditioning

revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 42
Speed 1/min : 1500
Checkbk. volt mV : 2700
Measuring
temperature °C : 44
Fuel delivery cm³/ : 67.6...70.0
> 1000s : (66.3...71.3)
Dispersion cm³/ : 2.0
> 1000s : (2.5)

3rd temperature-conditioning

revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 42
Speed 1/min : 1250
Checkbk. volt mV : 2000
Measuring
temperature °C : 44
Fuel delivery cm³/ :
> 1000s : (28.2...32.2)
Dispersion cm³/ :
> 1000s : (2.5)

4th temperature-conditioning

revolution 1/min : 2100/100
Checkbk. volt mV : 2500
Output
temperature °C : 45
Speed 1/min : 1000
Checkbk. volt mV : 2700
Measuring
temperature °C : 45
Fuel delivery cm³/ : 68.4...70.8
> 1000s : (67.1...72.1)
Dispersion cm³/ : 2.0
> 1000s : (2.5)

5th temperature-conditioning

revolution 1/min : 2100
Checkbk. volt mV : 2500
Output
temperature °C : 48
Speed 1/min : 600
Checkbk. volt mV : 2300
Measuring
temperature °C : 46
Fuel delivery cm³/ : 44.8...47.8
> 1000s : (43.8...48.8)
Dispersion cm³/ : 2.0
> 1000s : (2.5)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 400
Checkbk. volt mV : 1830
Meßtemperatur °C : 49
Fuel delivery cm³/ :
> 1000s : (13.5...18.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ :
> 1000s : (2.5)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 100
Checkbk. volt mV : 2900
Measuring
temperature °C : 49
Fuel delivery cm³/ :
> 1000s : 56.0
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 2100
Checkbk. volt mV : 2700
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture :
 Edition : 19.10.1992
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE4/10E2250R440-1

 Type No. : 0 460 404 995
 Customer Ident.No. :

 Customer-specific details
 Customer : VW

 Engine : 028.C

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

 Calibrating nozzle-holder assembly > : 1 688 901 114

 Opening pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 006

 Test line : 0 986 612 432
 (fuel-delivery actuator) : (KDEP 1865/3)

 Test line : 0 986 612 983
 (solenoid valve : (KDEP 1190)
 start of injection)

TEST PRECONDITIONS

Test oil
 return temp. > °C
 with thermometer : 55

 Test oil supply
 temperature > °C : 42...47

 Hold-up
 revolutions >1/min : 1200
 Feedback
 voltage mV : 2500

Actuator
 Connections 4 and 7
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground, Mohms min. : 1.0
 Connections 2 and 7 Mohms min. : 1.0
 Connections 4 and 6 Mohms min. : 1.0

 Control-collar travel sensor
 Test temperature :
 15°...70°C
 Connections 2 and 3 kohms : 1.0...3.0
 Connections 1 and 3 kohms : 0.5...2.0

Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

 Temperature sensor, fuel
 Connentions 5 and 6
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

 Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground Mohms min. : 1.0

 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2245

Setting value, bar : 6.5...7.1

Timing device travel:

Speed 1/min : 750

Checkbk. volt

mV : 3350

Setting value, mm : 10.70...10.90

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2480

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 40.1...40.5

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000

Checkbk. volt

mV : 3890

Supply pump

pressure > bar : 9.0...9.6

> bar :

2st speed 1/min : 150

Checkbk. volt

mV : 2230

Supply pump

pressure > bar : mind.3.5

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2245

Timing device

travel mm : 9.3...11.7
> mm : (8.9...12.1)

2nd speed 1/min : 750

Checkbk. volt. mV : 3350

Timing device

travel mm :
> mm : (9.8...11.8)

3rd speed 1/min : 1400

Checkbk. volt. mV : 1475

Timing device

travel mm : max. 0.8
> mm :

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 2000

Checkbk. volt. mV : 3890

Timing device

travel mm : 11.6...12.8
> mm : (11.4...13.0)

5.th speed 1/min : 150

Checkbk. volt. mV : 2230

Timing device

travel mm : 2.0...7.0
> mm : (mind.1.5)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2000

Checkbk. volt. mV : 3890

Measuring

temperature °C : 53

Overflow : 110...165
> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
 revolution 1/min : 100
 Checkbk. volt mV : 2500
 Output
 temperature °C : 51
 Speed 1/min : 2000
 Checkbk. volt mV : 3890
 Meßtemperatur °C : 53
 Fuel delivery cm³/ : 49.3...51.9
 > 1000s : (48.8...52.4)
 Dispersion cm³/ : 2.5
 > 1000s. : (2.5)

2nd temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 60
 Speed 1/min : 1000
 Checkbk. volt mV : 2860
 Measuring
 temperature °C : 56
 Fuel delivery cm³/ : 42.9...45.5
 > 1000s : (42.7...45.7)
 Dispersion cm³/ : 2.5
 > 1000s : (2.5)

3rd temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 750
 Checkbk. volt mV : 2480
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ :
 > 1000s : (39.0...41.6)
 Dispersion cm³/ :
 > 1000s : (2.5)

4th temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 500
 Checkbk. volt mV : 2245
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ : 38.3...40.9
 > 1000s : (37.3...41.9)
 Dispersion cm³/ : 3.0
 > 1000s : (3.0)

Idle delivery:

1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 500
 Checkbk. volt mV : 1600
 Meßtemperatur °C : 57
 Fuel delivery cm³/ : 11.8...16.8
 > 1000s : (11.3...17.3)
 Solenoid valve
 Start of
 injection, volts : 12
 Dispersion cm³/ : 4.0
 > 1000s : (4.0)

Starting fuel delivery:
 1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 65
 Speed 1/min : 100
 Checkbk. volt mV : 2230
 Measuring
 temperature °C : 61
 Fuel delivery cm³/ :
 > 1000s : 31.8
 Solenoid valve
 Start of
 injection, volts : 12

Stop test:
 Speed 1/min : 750
 Checkbk. volt mV : 2480
 ELAB volts : 0
 Fuel delivery cm³/ :
 max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
 min.> volts : 10.0
 Rated voltage,
 volts : 12.0

Notes:

Take note of test instructions
 "Distributor pump for direct
 injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 5.8...6.2
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 376

BOSCH TEST SPECS. IP ASSEMBLY
 Pump : PE 6 P 120 A 320 RS 8018
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 896 007

TEST SHEET : VOL
 Edition : 06.93 (2) EN
 Type number : 0 412 826 019
 Type number : 0 421 890 010
 CUSTOMER IDENT. NO.:

=====
 Customer-specific details
 Customer: VOLVO (BUS 8885, 8889)
 Engine: THD 103KF, KB, TD 103KB, KF
 Output kW: 180/210
 at 1/min:
 =====

	Min	Max
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Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -
 Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	2.95	3.05
P Prestroke (from BDC)	mm	2.90	3.10
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No.	- 2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value	V	3.100
U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10
Check value		
U/actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position		
Speed	1/min	60
pos.amplitude V	0.8	2.0
P pos.amplitude V	0.6	3.0
Speed	1/min	600
Difference		
Amplitude to		
Amplitude	V	max. 1.4

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	650
U/actual	V	2.800
Fuel		
delivery	cm ³ /1000str	295.0 297.0
Fuel		
delivery	cm ³ /1000str	292.0 300.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	11.0

Test point L1

Speed	1/min	300
U/actual	V	1.340 1.460
Fuel		
delivery	cm ³ /1000str	24.0 28.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	8.0

REMARKS

VOLVO-No.: 425 510

Dimension "Y"
(Adjustment flange) 15.6 16.1

- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PE 6 P 120 A 320 RS 8019
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 896 008

TEST SHEET : VOL
 Edition : 06.93 (2) EN
 Type number : 0 412 826 020
 Type number : 0 421 890 010
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: VOLVO (LKW3047/1)
 Engine: TD 123 EA/EB/EC
 Output kW: 221/234/265
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	4.30	4.40
P Prestroke (from BDC)	mm	4.25	4.45
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No.	- 2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
- Speed 1/min 600
 Difference
 Amplitude to
 Amplitude V max. 1.4

Continued on next page

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	600
U/actual	V	3.100
Fuel		
delivery	cm ³ /1000str	345.0 347.0
Fuel		
delivery	cm ³ /1000str	342.0 350.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	11.0

Test point L1

Speed	1/min	300
U/actual	V	1.340 1.460
Fuel		
delivery	cm ³ /1000str	31.0 35.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	8.0

REMARKS

VOLVO-No.: 479 887

Dimension "Y"
(Adjustment flange) 15.6 16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel
position at start of delivery
of cylinder No. 1.

4) = U/actual value min.:
U/actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PE 6 P 120 A 320 RS 8020
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 896 009

TEST SHEET : VOL
 Edition : 06.93 (2) EN
 Type number : 0 412 826 021
 Type number : 0 421 890 010
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: VOLVO (LKW)
 Engine: TD 123 E/ES, TD 103E/ES
 Output kW: 262/290/210/235
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	.
Inlet pressure	bar	2.5	2.6
Overflow	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	3.95	4.05
P Prestroke (from BDC)	mm	3.90	4.10
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No.	- 2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value		
U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

U/actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position
 Speed 1/min 60
 pos.amplitude V 0.8 2.0
 P pos.amplitude V 0.6 3.0

Speed	1/min	600
Difference		
Amplitude to		
Amplitude	V	max. 1.4

Continued on next page

	Min	Max
--	-----	-----

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	600
U/actual	V	2.800
Fuel		
delivery	cm ³ /1000str	301.0 303.0
Fuel		
delivery	cm ³ /1000str	298.0 306.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	11.0

Test point L1

Speed	1/min	250
U/actual	V	1.340 1.460
Fuel		
delivery	cm ³ /1000str	20.0 24.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	8.0

REMARKS

VOLVO-No.: 479 889

Dimension "Y"
 (Adjustment flange) 15.6 16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel
 position at start of delivery
 of cylinder No. 1.4) = U/actual value min.:
 U/actual minimum value with
 deenergized servo magnet and
 control rod in shutoff
 position.

BOSCH TEST SPECS. IP ASSEMBLY
 Pump : PE 6 P 120 A 320 RS 8020-1
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 896 010

TEST SHEET : VOL
Edition : 06.93 (2) EN
Type number : 0 412 826 022
Type number : 0 421 890 010
CUSTOMER IDENT. NO.:

=====
 Customer-specific details
 Customer: VOLVO LKW 3027/2-BUS8886
 Engine: TD 123 ED, THD 103, KD
 Output kW: 302/250
 at 1/min:
 =====

Min	Max
-----	-----

Test PREREQUISITES	
--------------------	--

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS	
---------------------	--

Section A -	
Setting values of injection pump	
- Check values denoted by "P"	
- No basic setting. Equal delivery setting under Section C.	

PORT CLOSING	
--------------	--

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	3.95	4.05
P Prestroke (from BDC)	mm	3.90	4.10
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

TEST SHEET : VOL
Edition : 06.93 (2) EN
Type number : 0 412 826 022
Type number : 0 421 890 010
CUSTOMER IDENT. NO.:

Min	Max
PC mark	Cyl.-No. - 2)
Pulse wheel position (PC cam)	°CS 0 3)
Tolerance +/- °CS	0.20
P Tolerance +/- °CS	0.75

Section B -	
-------------	--

Actuator test	
- Check values denoted by "P"	
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V	

CONTROL-ROD PICKUP SETTING	
----------------------------	--

Test speed	1/min 0
Setting value	
U/actual	V 3.100
Control-rod travel	mm 12.95 13.05
P Control-rod travel	mm 12.90 13.10
Check value	
U/actual	V 1.700
Control-rod travel	mm 5.90 6.40
P Control-rod travel	mm 5.85 6.45

Stop position	
---------------	--

U/actual	V mind. 4)
Control-rod travel	mm 0.5 1.0
P Control-rod travel	mm 0.4 1.1

SPEED SENSOR SIGNALS	
----------------------	--

- Test with control rod in stop position	
Speed 1/min 60	
pos.amplitude V 0.8 2.0	
P pos.amplitude V 0.6 3.0	
Speed 1/min 600	
Difference	
Amplitude to	
Amplitude V max. 1.4	

Continued on next page

	Min	Max
--	-----	-----

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	600
U/actual	V	2.800
Fuel		
delivery	cm ³ /1000str	301.0 303.0
Fuel		
delivery	cm ³ /1000str	298.0 306.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	11.0

Test point L1

Speed	1/min	300
U/actual	V	1.340 1.460
Fuel		
delivery	cm ³ /1000str	29.0 33.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	8.0

REMARKS

VOLVO-No.: 479 888

Dimension "y"
(Adjustment flange) 15.6 16.1

- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PE 6 P 120 A 320 RS 8021
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 896 011

TEST SHEET : VOL
 Edition : 06.93 (2) EN
 Type number : 0 412 826 023
 Type number : 0 421 890 010
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: VOLVO (BUS 886)
 Engine: THD 103 KD
 Output kW: 250
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	3.95	4.05
P Prestroke (from BDC)	mm	3.90	4.10
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No. -	2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0		
Setting value			
U/actual	V 3.100		
Control-rod travel	mm 12.95	13.05	
P Control-rod travel	mm 12.90	13.10	

Check value

U/actual	V 1.700		
Control-rod travel	mm 5.90	6.40	
P Control-rod travel	mm 5.85	6.45	

Stop position

U/actual	V mind. 4)		
Control-rod travel	mm 0.5	1.0	
P Control-rod travel	mm 0.4	1.1	

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min 60		
pos.amplitude	V 0.8	2.0	
P pos.amplitude	V 0.6	3.0	

Speed	1/min 600		
Difference			
Amplitude to			
Amplitude	V max. 1.4		

Continued on next page

===== Min Max =====

S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	600
U/actual	V	2.800
Fuel		
delivery	cm ³ /1000str	301.0 303.0
Fuel		
delivery	cm ³ /1000str	298.0 306.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	11.0

Test point L1

Speed	1/min	250
U/actual	V	1.340 1.460
Fuel		
delivery	cm ³ /1000str	29.0 33.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	8.0

REMARKS

VOLVO-No.: 425 515

Dimension "Y"
(Adjustment flange) 15.6 16.1

- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PE 6 P 120 A 320 RS 8022
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 896 012

TEST SHEET : VOL
 Edition : 06.93 (2) EN
 Type number : 0 412 826 024
 Type number : 0 421 890 010
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: VOLVO (LKW 3113)
 Engine: TD 103 E, ES
 Output kW: 210/235
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	3.95	4.05
P Prestroke (from BDC)	mm	3.90	4.10
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark Cyl.-No.	-	2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value	V	3.100	
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position
 Speed 1/min 60
 pos.amplitude V 0.8 2.0
 P pos.amplitude V 0.6 3.0

Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max.	1.4

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	600
U/actual	V	2.800
Fuel		
delivery	cm ³ /1000str	301.0 303.0
Fuel		
delivery	cm ³ /1000str	298.0 306.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	11.0

Test point L1

Speed	1/min	250
U/actual	V	1.340 1.460
Fuel		
delivery	cm ³ /1000str	20.0 24.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	8.0

REMARKS

VOLVO-No.: 425 515

Dimension "y"
(Adjustment flange) 15.6 16.1

- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : IVECO
 Date of manufacture :
 Edition : 04.05.1992
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE4/11E1900R480

 Type No. : 0 460 414 998
 Customer Ident.No. :

 Customer-specific details
 Customer : IVECO

 Engine : 840.47.2790

Output kW :
 Speed 1/min : 3800

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

 Calibrating nozzle-holder assembly > : 1 688 901 116

 Opening pressure > bar : 207...210

 Test pressure line : 1 680 750 073

 Outer diameter : 6.00
 x wall thickness > : 2.00
 x length > mm : 450

 Overflow valve : 2 467 413 006

 Test line : KDEP 1865/3
 (fuel-delivery actuator)

 Test line : KDEP 1865/6
 (solenoid valve
 start of injection)

TEST PRECONDITIONS

Test oil
 return temp. > °C
 with thermometer : 45

 Test oil supply
 temperature > °C : 35...40

Hold-up
 revolutions >1/min : 1100
 Feedback
 voltage mV : 2500

Actuator
 Connections 4 and 7
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground, Mohms min. : 1.0
 Connections 2 and 7 Mohms min. : 1.0
 Connections 4 and 6 Mohms min. : 1.0

Control-collar travel sensor
 Test temperature :
 15°...70°C
 Connections 2 and 3 kohms : 1.0...3.0
 Connections 1 and 3 kohms : 0.5...2.0

Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
 Connentions 5 and 6
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground Mohms min. : 1.0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 1950

Setting value, bar : 6.6...7.2

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 1952

Setting value, mm : 9.10...9.30

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 1900

Checkbk. volt

mV : 2500

Output

temperature °C : 48

Speed 1/min : 750

Checkbk. volt

mV : 2050

Measuring

temperature °C : 46

Fuel delivery cm³/

> 1000s : 34.3...34.7

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 1900

Checkbk. volt

mV : 3500

Supply pump

pressure > bar : 8.5...9.1

> bar :

2st speed 1/min : 150

Checkbk. volt

mV : 2870

Supply pump

pressure > bar : mind.3.8

Timing device variations:

1st speed 1/min : 750

Checkbk. volt. mV : 2050

Timing device

travel mm : 8.9...11.3
> mm : (8.8...11.4)

2nd speed 1/min : 500

Checkbk. volt. mV : 1950

Timing device

travel mm :
> mm : (8.7...9.7)

3rd speed 1/min : 1900

Checkbk. volt. mV : 3500

Timing device

travel mm : 10.9...11.6
> mm : (11.4...13.0)

Solenoid valve

4.th speed 1/min : 900

Checkbk. volt. mV : 1420

Timing device

travel mm : max. 0,3
> mm :

Start of
injection, volts : 12

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 41

Speed 1/min : 1900

Checkbk. volt. mV : 3500

Measuring

temperature °C : 43

Overflow : 40...60

> cm³/10s : (35...65)

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 41
Speed 1/min : 1900
Checkbk. volt mV : 3500
Meßtemperatur °C : 43
Fuel delivery cm³/ : 61.8...64.4
> 1000s : (61.6...64.6)
Dispersion cm³/ : 4.0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 1900
Checkbk. volt mV : 2500
Output
temperature °C : 45
Speed 1/min : 1185
Checkbk. volt mV : 2170
Measuring
temperature °C : 45
Fuel delivery cm³/ : 29.0...33.0
> 1000s : (28.7...33.3)
Dispersion cm³/ : 2,5
> 1000s : (3.5)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.0...41.0)
Dispersion cm³/ :
> 1000s : (5.0)

4th temperature-conditioning
revolution 1/min : 1900
Checkbk. volt mV : 2500
Output
temperature °C : 45
Speed 1/min : 900
Checkbk. volt mV : 2900
Measuring
temperature °C : 45
Fuel delivery cm³/ : 64.2...67.2
> 1000s : (63.9...67.5)
Dispersion cm³/ : 2.5
> 1000s : (3.5)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 1900
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 400
Checkbk. volt mV : 1670
Meßtemperatur °C : 49
Fuel delivery cm³/ :
> 1000s : (10.5...16.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ :
> 1000s : (3.5)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 1900
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 100
Checkbk. volt mV : 2870
Measuring
temperature °C : 49
Fuel delivery cm³/ :
> 1000s : 83.5
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1100
Checkbk. volt mV : 3500
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
min. > volts : 10.0
Rated voltage,
volts : 12.0

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 6,2...6,6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : ROW
 Date of manufacture:
 Edition : 01.06.1993
 Replaces:
 Test oil : ISO 4113

Injection pump : VE4/11E2000R500

Type No. : 0 460 414 997
 Customer Ident.No. :

Customer-specific details
 Customer : ROW

Engine : Gemini 3 2.5Tdi

Output kW :
 Speed 1/min. :

TEST BENCH PREREQUISITES

Inlet pressure, bar: 0,30...0,40

Calibrating nozzle-holder assembly > : 1 688 901 116

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6,00
 x wall thickness > : 2,20
 x length > mm : 350

Overflow valve :

Test line : 0 986 612 437
 (fuel-delivery actuator) : (KDEP 1865/8)

Test line : 0 986 612 438
 (solenoid valve start of injection) : (KDEP 1865/9)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer : 55

Test oil supply temperature > °C : 42...47

Hold-up revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator
 Connections 5 and 6
 Test temperature:
 15°...30°C, ohms : 0,4...1,0
 50°...70°C, ohms : 0,45...1,1

Connections 5 and ground, Mohms min. : 1,0

Connections 5 and ground, Mohms min. : 1,0

Connections 3 and 5 Mohms min. : 1,0

Connections 3 and 7 Mohms min. : 1,0

High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2 Ohm : 4,9...6,5

Connections 2 and 3 Ohm : 4,9...6,5

Connections 1 and 3 Ohm : 9,8...13,0

Connections 1 and ground, Mohms min. : 1,0

Connections 2 and ground, Mohms min. : 1,0

Connections 3 and ground, Mohms min. : 1,0

Temperature sensor, fuel
 Connentions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1,2...4,0
 50°...70°C, kohms : 0,3...1,2

Connections 4 and ground, Mohms min. : 1,0

Connections 7 and ground Mohms min. : 1,0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14,3...17,3
 50°...70°C, ohms : 15,5...21,0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 1000

Checkbk. volt.

mV : 3500

Setting value, bar : 6,42...6,8

Timing device travel:

Speed 1/min : 1000

Checkbk. volt

mV : 3500

Setting value, mm : 8,8...9,2

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2430

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 53,9...54,3

Dispersion cm³/ : 2,5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000

Checkbk. volt

mV : 3500

Supply pump

pressure > bar : 7,5...8,1

> bar :

2st speed 1/min : 200

Checkbk. volt

mV : 2870

Supply pump

pressure > bar : 4,7...5,7

> bar :

Timing device variations:

1st speed 1/min : 1000

Checkbk. volt. mV : 3500

Timing device

travel mm :

> mm :

2nd speed 1/min : 2000

Checkbk. volt. mV : 3500

Timing device

travel mm : 11,6...12,8

> mm :

3rd speed 1/min : 1000

Checkbk. volt. mV : 1560

Timing device

travel mm : max. 0,5

> mm :

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 500

Checkbk. volt. mV : 2870

Timing device

travel mm : 6,4...7,4

> mm :

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2000

Checkbk. volt. mV : 3500

Measuring

temperature °C : 53

Overflow : 110...165

> cm³/10 :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3500
Meßtemperatur °C : 53
Fuel delivery cm³/ : 68,7...70,7
> 1000s :
Dispersion cm³/ : 2,5
> 1000s. :

2nd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3200
Measuring
temperature °C : 56
Fuel delivery cm³/ : 78,4...81,4
> 1000s :
Dispersion cm³/ : 2,5
> 1000s. :

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2430
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s :
Dispersion cm³/ :
> 1000s. :

4th temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2870
Measuring
temperature °C : 57
Fuel delivery cm³/ : 85,7...88,7
> 1000s :
Dispersion cm³/ : 3,0
> 1000s. :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 550
Checkbk. volt mV : 1450
Meßtemperatur °C : 57
Fuel delivery cm³/ : 7,7...11,7
> 1000s :
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4,0
> 1000s :

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 3130
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 84,8
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 1000
Checkbk. volt mV : 3000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 5,0

Shutoff solenoid:

Cut-in voltage
min.> volts : 10,0
Rated voltage,
volts : 12,0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

BOSCH INJECTION PUMP TEST SPECIFICATIONS		ELECTRICAL TEST
Observe notes in remark column		Actuator
Test sheet	: VW	Connections 5 and 6
Date of manufacture:		Test temperature: 15°...30°C, ohms : 0.4...1.0
Edition	: 10.05.1994	50°...70°C, ohms : 0.45...1.1
Replaces	: 01.06.1993	Connections 5 and ground, Mohms min. : 1.0
Test oil	: ISO 4113	Connections 6 and ground, Mohms min. : 1.0
Injection pump	: VE4/11E2250R510	Connections 3 and 5 Mohms min. : 1.0
Type No.	: 0 460 404 994	Connections 5 and 7 Mohms min. : 1.0
Customer Ident.No.:		High-pressure compressor sensor Sensor coils
Customer-specific details		Connections 3 and 2 Ohms : 4.9...6.5
Customer	: VW	Connections 1 and 2 Ohms : 4.9...6.5
Engine	: 028.C	Connections 1 and 3 Ohms : 9.8...13.0
Output kW	:	Connections 1 and ground, Mohms min. : 1.0
Speed 1/min :		Connections 2 and ground, Mohms min. : 1.0
TEST BENCH PREREQUISITES		Connections 3 and ground, Mohms min. : 1.0
Inlet pressure, bar	: 0.30...0.40	Temperature sensor, fuel Connections 4 and 7
Calibrating nozzle-holder assembly >	: 1 688 901 114	Test temperature: 15°...30°C, kohms : 1.2...4.0
Opening pressure >	bar : 207...210	50°...70°C, kohms : 0.3...1.2
Test pressure line	: 1 680 750 085	Connections 4 and ground, Mohms min. : 1.0
Outer diameter	: 6.00	Connections 7 and ground Mohms min. : 1.0
x wall thickness >	: 2.20	Solenoid valve, start of injection Connections 1 and 2
x length > mm	: 350	Test temperature: 15°...30°C, ohms : 14.3...17.3
Overflow valve	: 2 467 413 006	50°...70°C, ohms : 15.5...21.0
Test line	: KDEP 1865/10 (fuel-delivery actuator)	Starting stop mV : 4120...4650
Test line	: KDEP 1190 (solenoid valve start of injection)	Shutoff stop mV : 650...850
TEST PREREQUISITES		
Test oil		
return temp. > °C		
with thermometer	: 55	
Test oil supply		
temperature > °C	: 42...47	
Hold-up		
revolutions >1/min	: 1200	
Feedback		
voltage mV	: 2500	

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2245
Setting value, bar : 6.2...7.2

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2245
Setting value, mm : 10.8...11.0

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 38.8...39.2
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:
1st speed 1/min : 2000
Checkbk. volt
mV : 3890
Supply pump
pressure > bar : 8.6...9.6
> bar :

2st speed 1/min : 150
Checkbk. volt
mV : 2230
Supply pump
pressure > bar : mind. 3.5
> bar :

Timing device variations:

1st speed 1/min : 300
Checkbk. volt. mV : 2245
Timing device
travel mm :
> mm : (8.9...12.1)

2nd speed 1/min : 2000
Checkbk. volt. mV : 3890
Timing device
travel mm : 11.6...12.8
> mm : (11.4...13.0)

3rd speed 1/min : 1400
Checkbk. volt. mV : 1475
Timing device
travel mm : max. 0.5
> mm : (max. 0.8)

Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 500
Checkbk. volt. mV : 2245
Timing device
travel mm : 10.8...11.0
> mm : (9.9...11.9)

5.th speed 1/min : 150
Checkbk. volt. mV : 2230
Timing device
travel mm :
> mm : (mind. 1.5)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt. mV : 3890
Measuring
temperature °C : 53
Overflow : 96...150
> cm³/10s : (83...165)

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3890
Meßtemperatur °C : 53
Fuel delivery cm³/ : 48.4...51.0
> 1000s : (47.9...51.)
Dispersion cm³/ : 2.5
> 1000s. :

2nd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 2860
Measuring
temperature °C : 56
Fuel delivery cm³/ : 42.1...44.7
> 1000s : (41.9...44.9)
Dispersion cm³/ : 2.5
> 1000s. :

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.7...40.3)
Dispersion cm³/ :
> 1000s. :

4th temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2245
Measuring
temperature °C : 57
Fuel delivery cm³/ : 36.9...39.5
> 1000s : (35.9...40.,.)
Dispersion cm³/ : 3.0
> 1000s. :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1600
Meßtemperatur °C : 57
Fuel delivery cm³/ : 11.5...16.5
> 1000s : 11.0...17.0)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4,0
> 1000s. :

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65

Speed 1/min : 100
Checkbk. volt mV : 2230
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 30,4

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 750
Checkbk. volt mV : 2480
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Start of

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PES 5 M 55 C 320 RS 202
 Regulator : RE 22
 IP-ASSEMBLY: 0 400 195 001

TEST SHEET : MB
 Edition : 11.93 EN
 Type number : 0 410 055 971
 Type number : 0 420 090 002
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MERCEDES BENZ
 Engine: OM 605
 Vehicle: C 250 D
 Output kW: 83 KW

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		1 469 990 351	
Inlet pressure	bar	0.9	1.1
Overflow 1)	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 111	
Opening pressure	bar	147	150
Perforated plate diameter	mm	--	--
Test pressure line		1 680 750 014	
Dimensions:			
Outer diameter	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -
 Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	1.70	1.80
P Prestroke (from BDC)	mm	1.65	1.85
Control-rod travel	mm	16.0	18.0
Cam sequence	1 - 2 - 4 - 5 - 3		
PC difference °CS	0-72-144-216-288		
tolerance +/- °CS		--	
P tolerance +/- °CS		1.0	

		Min	Max
PC mark	Cyl.-No.	-	
Pulse wheel position	(PC cam)	°CS	16.5
Tolerance +/- °CS			0.20
P Tolerance +/- °CS			0.30
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm			
CONTROL-ROD PICKUP SETTING			
Test speed		1/min 0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.45	12.55
P Control-rod travel	mm	12.40	12.60
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.25	5.75
P Control-rod travel	mm	5.20	5.80
Stop position			
U/actual	V	0.655	0.785
Control-rod travel	mm	1.0	1.0
P Control-rod travel	mm	1.0	1.0
Start position			
U/actual	V	4.385	4.615
Control-rod travel	mm	18.2	19.8
P Control-rod travel	mm	18.2	19.8

Continued on next page

===== Min Max =====

S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1000
U/actual	V	3.250
Fuel		
delivery	cm ³ /1000str	35.0 36.0
P Fuel		
delivery	cm ³ /1000str	33.5 37.5
Dispersion	cm ³ /1000str	2.5
P Dispersion	cm ³ /1000str	3.0
Speed	1/min	315
U/actual	V	2.100 2.100
Fuel		
delivery	cm ³ /1000str	3.0 9.0
Dispersion	cm ³ /1000str	1.0
P Dispersion	cm ³ /1000str	1.5

BOSCH EP TEST VALUES

Please note information given under "Remarks"

Test sheet: Mercedes-Benz
Date of issue: 10.06.1994 EN

Combination no.: 0 402 648 898
Combination no.: 0 402 648 906
Combination no.: 0 402 648 908
Combination no.: 0 402 648 918

Injection pump designation: PE 8 P..LS 7838 and ..LS 7838-10

Combination no.: 0 402 648 893
Combination no.: 0 402 648 894
Combination no.: 0 402 648 895
Combination no.: 0 402 648 914
Combination no.: 0 402 648 915

Injection pump designation: PE 8 P..LS 7835 and ..LS 7835-10

Combination no.: 0 402 648 900
Combination no.: 0 402 648 901
Combination no.: 0 402 648 909
Combination no.: 0 402 648 910

Injection pump designation: PE 8 P..LS 7840 and ..LS 7840-10

Combination no.: 0 402 646 921
Combination no.: 0 402 646 924
Combination no.: 0 402 646 925
Combination no.: 0 402 646 931
Combination no.: 0 402 646 942
Combination no.: 0 402 646 950

Injection pump designation: PE 6 P..LS 7837 and ..LS 7837-10

Combination no.: 0 402 646 917
Combination no.: 0 402 646 926
Combination no.: 0 402 646 929
Combination no.: 0 402 646 922
Combination no.: 0 402 646 954
Combination no.: 0 402 646 930

Injection pump designation: PE 6 P..LS 7834 and ..LS 7834-10

Combination no.: 0 402 646 952
Combination no.: 0 402 646 953
Combination no.: 0 402 646 957
Combination no.: 0 402 646 958
Combination no.: 0 402 646 915
Combination no.: 0 402 646 916
Combination no.: 0 402 646 939
Combination no.: 0 402 646 940
Combination no.: 0 402 646 959
Combination no.: 0 402 646 960

Injection pump designation: PE 6 P..LS 7836 and ..LS 7836-10

...

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Combination no.: 0 402 746 913

Combination no.: 0 402 746 916

Combination no.: 0 402 746 919

Injection pump designation: PE 6 P..LS 7237 and ..LS 7237-10

Remarks:

Information on repair and testing is given in the following Service Information:

W 400/..., RQ(V)..PA

Mercedes-Benz series 400 with P pump and two-stage LDA, low output

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY
 Pump: PES 6 R 120/720 RS 1502
 Regulator: RE 31
 IP-ASSEMBLY: 0 401 496 001

TEST SHEET : 0 401 496 001
 Edition : 12.94 (1) EN
 Type number : 0 411 426 002
 Type number : 0 421 890 200
 CUSTOMER IDENT. NO.:

=====
 Customer-specific details
 Customer: VOLVO-TRUCK(NKW-3110)
 Engine: TD 163 ES, EJ
 Output kW: 370
 at 1/min:
 =====

	Min	Max
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Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORt CLOSING

PC setting cyl.	1		
Test pressure ba	30	32	
Prestroke (from BDC)	mm	5.35	5.45
P Prestroke (from BDC)	mm	5.30	5.50
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No.	- 2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value	U/actual	V 3.100	
P Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position			
Speed	1/min	60	
pos. amplitude	V	0.8	2.0
P pos. amplitude	V	0.6	3.0

Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max. 1.4	

Continued on next page

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	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	550
U/actual	V	2.950
Fuel		
delivery	cm ³ /1000str	389.0 391.0
P Fuel		
delivery	cm ³ /1000str	386.0 394.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	10.0

Test point L1

Speed	1/min	300
U/actual	V	1.470 1.590
Fuel		
delivery	cm ³ /1000str	17.0 23.0
Dispersion	cm ³ /1000str	7.0
P Dispersion	cm ³ /1000str	11.0

REMARKS

VOLVO-No.: 1 556 156-P03-RELEASED

Dimension "y"
(Adjustment flange) 15.6 16.1

- 1) = Arrangement of pressure-relief valve:
Pump side 4.1 (previous: pump side 1 rear).
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH TEST SPECS. IP ASSEMBLY
 Pump : PE 6 R 130/720 RS 1503
 Regulator : RE 31
 IP-ASSEMBLY: 0 401 496 002

TEST SHEET : 0 401 496 002
 Edition : 12.94 (1) EN
 Type number : 0 411 436 001
 Type number : 0 421 890 201
 CUSTOMER IDENT. NO.:

Customer-specific details
 Customer: IVECO - UNIC
 Engine: 8210.42.5000 (NWK)
 Output kW:
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 075	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	1000	

TEST SPECIFICATIONS

Section A -
 Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	6.95	7.05
P Prestroke (from BDC)	mm	6.90	7.10
Control-rod travel	mm	13.0	14.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS	0.50		
P tolerance +/- °CS	0.75		

	Min	Max
PC mark	Cyl.-No.	- 2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value	U/actual	V	3.100
P Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0

P pos.amplitude V 0.6 3.0

Speed	1/min	600	
-------	-------	-----	--

Difference			
Amplitude to			
Amplitude	V	max.	1.4

Continued on next page

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	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	950
U/actual	V	3.218
Fuel		
delivery	cm ³ /1000str	278.0 280.0
P Fuel		
delivery	cm ³ /1000str	275.0 283.0
Dispersion	cm ³ /1000str	12.0
P Dispersion	cm ³ /1000str	16.0

Test point L1

Speed	1/min	300
U/actual	V	1.250 1.370
Fuel		
delivery	cm ³ /1000str	21.0 27.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	10.0

REMARKS

Dimension "y"
(Adjustment flange) 15.6 16.1

1) = Setting, ~~Start-of-delivery~~
in prestroke according to
value in control rod travel
13...14 mm.
Then test start-of-delivery
difference at other control
rod travels:

Control rod travel:	Start-of-delivery:
7.9...8.1 mm	very earlier: 0.25...1.75°
4.9...5.1 mm	1.75 3.75°

- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY
 Pump: PE 6 R 120/720 RS 1504
 Regulator: RE 31
 IP-ASSEMBLY 0 401 496 003

TEST SHEET : 0 401 496 003
 Edition : 12.94 (1) EN
 Type number : 0 411 426 003
 Type number : 0 421 890 200
 CUSTOMER IDENT. NO.:

=====
 Customer-specific details
 Customer: VOLVO-TRUCK (NWK-3059)
 Engine: TD 164
 Output kW: 382
 at 1/min:
 =====

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	30	32	
Prestroke (from BDC)	mm	5.35	5.45
P Prestroke (from BDC)	mm	5.30	5.50
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No. 1 2)	
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0		
Setting value			
U/actual	V 3.100		
Control-rod travel			
P Control-rod travel	mm 12.95	13.05	
	mm 12.90	13.10	

Check value

U/actual	V 1.70		
Control-rod travel			
P Control-rod travel	mm 5.90	6.40	
	mm 5.85	6.45	

Stop position

U/actual	V mind.	4)	
Control-rod travel	mm 0.5	1.0	
P Control-rod travel	mm 0.4	1.1	

SPEED SENSOR SIGNALS

- Test with control rod in stop position			
Speed	1/min 60		
pos.amplitude	V 0.8	2.0	
P pos.amplitude	V 0.6	3.0	
Speed	1/min 600		
Difference			
Amplitude to			
Amplitude	V max. 1.4		

Continued on next page

Testoil-ISO 4113

E13

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	525
U/actual	V	2.950
Fuel		
delivery	cm ³ /1000str	389.0 391.0
P Fuel		
delivery	cm ³ /1000str	386.0 394.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	10.0

Test point L1

Speed	1/min	265
U/actual	V	1.570 1.690
Fuel		
delivery	cm ³ /1000str	17.0 23.0
Dispersion	cm ³ /1000str	7.0
P Dispersion	cm ³ /1000str	11.0

REMARKS

VOLVO-Nr.: 1 556 415-P04-PRELIMIN
 Dimension "Y"
 (Adjustment flange) 15.6 16.1

- 1) = Arrangement of pressure-relief valve:
 Pump side 4.1 (previous: pump side 1 rear).
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min.:
 U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH

TEST SPECS. IP ASSEMBLY

Pump: PES 6 P 120 A 720 RS 3184
 Regulator: RE 24
 IP-ASSEMBLY: 0 402 196 703

TEST SHEET : 0 402 196 703
 Edition : 12.94 (1) EN
 Type number : 0 412 026 727
 Type number : 0 421 890 018
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: JOHN DEERE
 Engine: 6076 HRW 30
 Output kW: 181 (LR3 Tractor
 at 1/min:

	Min	Max
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Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 057	
Inlet pressure	bar	1.4	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	9.0	12.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No. 1 2)	
Pulse wheel position (PC cam)	°CS	10.5 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0		
Setting value			
U/actual	V 3.100		
Control-rod travel	mm 12.95	13.05	
P Control-rod travel	mm 12.90	13.10	

Check value

U/actual	V 1.700		
Control-rod travel	mm 5.90	6.40	
P Control-rod travel	mm 5.85	6.45	

Stop position

U/actual	V mind.	4)	
Control-rod travel	mm 0.5	1.0	
P Control-rod travel	mm 0.4	1.1	

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min 60		
pos.amplitude	V 0.8	2.0	
P pos.amplitude	V 0.6	3.0	

Speed	1/min 600		
Difference			
Amplitude to			
Amplitude	V max. 1.4		

Continued on next page

Testoil-ISO 4113

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1100
U/actual	V	2.710
Fuel		
delivery	cm ³ /1000str	140.0 142.0
P Fuel		
delivery	cm ³ /1000str	137.0 145.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	425
U/actual	V	1.340 1.460
Fuel		
delivery	cm ³ /1000str	18.0 24.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	10.0

REMARKS

John Deere-Nr.: RE 57 372

Dimension "Y"
(Adjustment flange)

- 2) = Port-closing mark 10.5° cam-shaft after port closing of cylinder 1.
- 3) = Pulse wheel position 10.5° camshaft after port closing of cylinder No. 1.
- 4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

Pump : PE 6 H 120/320 LS 4
 Regulator : RE 36
 IP-ASSEMBLY: 0 402 696 031

TEST SHEET : 0 402 696 031
 Edition : 11.94 (2) EN
 Type number : 0 412 626 001
 Type number : 0 421 890 353
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MB
 Engine: OM 441 LA
 Output kW: 250
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature, °C	38	42
Overflow valve	2 417 413 082	
Inlet pressure bar	--	--
Overflow 1) 1/h	160	170
Calibrating nozzle-holder assembly	1 688 901 105	
Opening pressure bar	207	210
Perforated plate diameter mm	--	
Test pressure line	1 680 750 089	
Dimensions:		
Outer diameter. mm	8.0	
x wall thickness mm	2.5	
x length mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	6	
Test pressure bar	30	32
Prestroke (from BDC)	mm	6.95 7.05
P Prestroke (from BDC)	mm	6.90 7.10
Control-rod travel	mm	10.0 11.0
Cam sequence	6 - 3 - 5 - 2 - 4 - 1	
PC difference °CS	60 each	
tolerance +/- °CS	0.15	
P tolerance +/- °CS	0.30	

	Min	Max
PC mark Cyl.-No.	6	2)
Nockenscheibe-Position (PC cam)	°CS	3)
Tolerance +/- °CS	--	--
P Tolerance +/- °CS	--	--

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

U/actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Continued on next page

Testoil-ISO 4113

E17

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1050
U/actual	V	3.100

Prestroke magnet -

Magnet stroke mm 8.0

Fuel

delivery cm³/1000str 354.0 356.0

P Fuel

delivery cm³/1000str 351.0 359.0Dispersion cm³/1000str 5.0P Dispersion cm³/1000str 9.0

Test point L1

Speed	1/min	300
U/actual	V	1.440 1.560

Prestroke magnet -

Magnet stroke mm 8.0

Fuel

delivery cm³/1000str 22.0 28.0Dispersion cm³/1000str 8.0P Dispersion cm³/1000str 12.0

Testoil-ISO 4113

REMARKS

Dimension "y"
(Adjustment flange) 15.6 16.1

- 1) = Setting of overflow at full load (refer to measurement point V1).
- 2) = Start-of-delivery incipient fissure on FB cyl. 6.
Tolerance +/ - 0.10° NW.
- 3) = Setting of cam disk position:
omitted.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

Pump : PE 6 H 120/320 LS 4-1
 Regulator : RE 36
 IP-ASSEMBLY: 0 402 696 032

TEST SHEET : 0 402 696 032
 Edition : 11.94 (1) EN
 Type number : 0 412 626 002
 Type number : 0 421 890 353
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MB
 Engine: OM 441 LA
 Vehicle: 250
 Output kW:

	Min	Max
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Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	3.4	3.6
Overflow 1)	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	--	--
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	6		
Test pressure bar	30	32	
Prestroke (from BDC)	mm	6.95	7.05
P Prestroke (from BDC)	mm	6.90	7.10
Control-rod travel	mm	10.0	11.0
Cam sequence		6-3-5-2-4-1	
PC difference °CS	60 each		
tolerance +/- °CS		0.15	
P tolerance +/- °CS		0.30	

	Min	Max
PC mark Cyl.-No. 6 2)		
Pulse wheel position (PC cam) °CS	3)	
Tolerance +/- °CS	0.20	
P Tolerance +/- °CS	0.30	

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Continued on next page

Testoil-ISO 4113

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	750
U/actual	V	3.000
Prestroke magnet -		
Magnet stroke	mm	7.0
Fuel		
delivery	cm ³ /1000str	374.0 376.0
Fuel		
delivery	cm ³ /1000str	371.0 379.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0
Speed	1/min	300
U/actual	V	1.440 1.560
Prestroke magnet -		
Magnet stroke	mm	8.0
Fuel		
delivery	cm ³ /1000str	22.0 28.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

Dimension "Y"
(Adjustment flange) 15.6 16.1

- 1) = Setting of overflow volume at full load omitted
- 2) = Start-of-delivery incipient fissure on FB cyl. 6.
Tolerance +/- 0.10° NW.
- 3) = Setting of cam disk position:
omitted.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

Pump : PE 6 H 120/320 LS 4-2
 Regulator : RE 36
 IP-ASSEMBLY: 0 402 696 033

TEST SHEET : 0 402 696 033
 Edition : 11.94 (1) EN
 Type number : 0 412 626 003
 Type number : 0 421 890 353
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MB
 Engine: OM 441 LA
 Output kW: 250
 at 1/min:

	Min	Max
PC mark	Cyl.-No. 6 2)	
Nockenscheibe-Position		
(PC cam)	°CS	3)
Tolerance +/- °CS	- -	
P Tolerance +/- °CS	- -	

Test PREREQUISITES

	Min	Max
Test oil inlet temperature	°C	38 42
Overflow valve	2 417 413 082	
Inlet pressure bar	3.4	3.6
Overflow 1) l/h	- -	- -
Calibrating nozzle-holder assembly	1 688 901 105	
Opening pressure bar	207	210
Perforated plate diameter	mm	- -
Test pressure line	1 680 750 089	
Dimensions:		
Outer diameter mm	8.0	
x wall thickness mm	2.5	
x length mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	6	
Test pressure bar	30	32
Prestroke (from BDC)	mm	6.95 7.05
P Prestroke (from BDC)	mm	6.90 7.10
Control-rod travel	mm	10.0 11.0
Cam sequence	6 - 3 - 5 - 2 - 4 - 1	
PC difference °CS	60 each	
tolerance +/- °CS		0.15
P tolerance +/- °CS		0.30

Continued on next page

Testoil-ISO 4113

Min Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	750
U/actual	V	3.000
Prestroke magnet -		
Magnet stroke	mm	7.0
Fuel		
delivery	cm ³ /1000str	374.0 376.0
P Fuel		
delivery	cm ³ /1000str	371.0 379.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9,0
Speed	1/min	300
U/actual	V	1.440 1.560
Prestroke magnet -		
Magnet stroke	mm	8.0
Fuel		
delivery	cm ³ /1000str	22.0 28.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

Dimension "Y"
(Adjustment flange) 15.6 16.1

- 1) = Setting of overflow volume:
omitted.
- 2) = Start-of-delivery incipient
fissure on FB cyl. 6.
Tolerance +/- 0.10° NW.
- 3) = Setting of cam disk position:
omitted.
- 4) = U/actual value min:
U/actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

Testoil-ISO 4113

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PE 6 P 120 A 720 RS 7211
 Regulator: RE 30
 IP-ASSEMBLY: 0 402 696 801

TEST SHEET : 0 402 696 801
 Edition : 12.94 (5) EN
 Type number : 0 412 626 838
 Type number : 0 421 890 009
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: SCANIA
 Engine: DTC 1102, DSE 1170
 Output kW:
 at 1/min:

Min Max

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 104	
Opening pressure	bar	250	253
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	5.00	5.10
P Prestroke (from BDC)	mm	4.95	5.15
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.30	
P tolerance +/- °CS		0.75	

PC mark	Cyl.-No.	1 2)	Min	Max
Pulse wheel position				
(PC cam)	°CS	0 3)		
Tolerance +/- °CS			0.20	
P Tolerance +/- °CS			0.75	

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max.	1.4

Continued on next page

Testoil-ISO 4113

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 5), 6))

Test point V1

Speed	1/min	700
U/actual	V	3.000

Fuel			
delivery	cm ³ /1000str	247.0	249.0
P Fuel			
delivery	cm ³ /1000str	244.0	252.0
Dispersion	cm ³ /1000str		8.0
P Dispersion	cm ³ /1000str		12.0

Test point L1

Speed	1/min	250	
U/actual	V	1,350	1,470

Fuel			
delivery	cm ³ /1000str	13.0	19.0
Dispersion	cm ³ /1000str		4.0
P Dispersion	cm ³ /1000str		8.0

REMARKS

SCANIA-No.: 1 328 037

Dimension "y"
(Adjustment flange) 15.6 16.1
(If provided;
adjustment flange was
introduced in the course
of series production).

- 1) = Arrangement of pressure-relief valve:
Pump side 4.2 (previous: pump side 2 rear).
- 2) = Start of delivery mark at start of delivery of cylinder No 1.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

Testoil-ISO 4113

REMARKS (Continued)

- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.
- 5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm:
Pump page 3.2
(previous: pump side 2).
- 6) = Delivery-valve holder:
 - * Valve spring pre-tension: mm 3.2 3.4
 - * Allowed variation: mm 3.0 3.5
 - * Required setting for new delivery-valve holders due to flattening: mm 2.9 3.1

BOSCH TEST SPECS. IP ASSEMBLY
 Pump : PE 6 P 120 A 320 RS 7874
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 696 802

TEST SHEET : 0 402 696 802
 Edition : 12.94 (1) EN
 Type number : 0 412 626 913
 Type number : 0 421 890 020
 CUSTOMER IDENT. NO.:

=====
 Customer-specific details
 Customer: Mercedes Benz
 Engine: OM 401 LA (Krupp crane)
 Output kW: 230
 at 1/min:
 =====

Min Max
 =====

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	1.4	1.6
Overflow 1)	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 075	
Dimensions:			
Outer diameter	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	1000	

TEST SPECIFICATIONS

Section A -
 Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

POR T CLOSING

PC setting cyl.	6		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	5.20	5.30
P Prestroke (from BDC)	mm	4.15	4.35
Control-rod travel	mm	20.0	21.0
Cam sequence	6 - 3 - 5 - 2 - 4 - 1		
PC difference °CS	60 each		
tolerance +/- °CS		0.30	
P tolerance +/- °CS		0.75	

PC mark	Cyl.-No.	6	2)
Pulse wheel position (PC cam)	°CS	0	3)
Tolerance +/- °CS			0.20
P Tolerance +/- °CS			0.75

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value	V	3.100	
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	5)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position
 Speed 1/min 60
 pos.amplitude V 0.8 2.0
 P pos.amplitude V 0.6 3.0

Speed	1/min	600
Difference		
Amplitude to		
Amplitude	V	max. 1.4

Continued on next page

Testoil-ISO 4113

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST A: TING

Test point V1

Speed	1/min	700
U/actual	V	3.100
Fuel		
delivery	cm ³ /1000str	229.0 231.0
P Fuel		
delivery	cm ³ /1000str	226.0 234.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0
Speed	1/min	350
U/actual	V	1.375 1.495
Fuel		
delivery	cm ³ /1000str	10.0 16.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	10.0

REMARKS

Mercedes Benz-Nr.: 0 250 743 602

Dimension "Y"
 (Adjustment flange) 15.6 16.1
 (If provided;
 adjustment flange was
 introduced in the course
 of series production).

- 2) = Start-of-delivery invipient fissure on FB cyl. 6.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.
- 4) = U/actual value min:
 U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY
 Pump: PE 8 H 120/320 LS 3
 Regulator: RE 36
 IP-ASSEMBLY: 0 402 698 031

TEST SHEET : 0 402 698 031
 Edition : 11.94 (2) EN
 Type number : 0 412 628 001
 Type number : 0 421 890 353
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MB
 Engine: OM 442 LA
 Output kW: 370
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature °C 38 42

Overflow valve 2 417 413 082

Inlet pressure bar 3.4 3.6

Overflow l/h - -

Calibrating nozzle-holder assembly 1 688 901 105

Opening pressure bar 207 210

Perforated plate diameter mm --

Test pressure line 1 680 750 089

Dimensions:

Outer diameter. mm 8.0

x wall thickness mm 2.5

x length mm 600

TEST SPECIFICATIONS

Section A -

Setting values of injection pump

- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORt CLOSING

PC setting cyl.	8	
Test pressure bar	30	32
Prestroke (from BDC)	mm	6.95 7.05
P Prestroke (from BDC)	mm	6.90 7.10
Control-rod travel	mm	10.0 11.0
Cam sequence	8-7-2-6-3-5-4-1	
PC difference °CS	45 each	
	tolerance +/- °CS 0.15	
P	tolerance +/- °CS 0.30	

	Min	Max
PC mark	Cyl.-No. 8	2)
Nockenscheibe-Position (PC cam)	°CS	3)
Tolerance +/- °CS	--	--
P Tolerance +/- °CS	--	--

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value		
U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

U/actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Continued on next page

Testoil-ISO 4113

Min Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	750
U/actual	V	2.800
Prestroke magnet -		
Magnet stroke mm		7.4
Fuel		
delivery	cm ³ /1000str	340.0 342.0
P Fuel		
delivery	cm ³ /1000str	337.0 345.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	300
U/actual	V	1.440 1.560
Prestroke magnet -		
Magnet stroke mm		8.0
Fuel		
delivery	cm ³ /1000str	20.0 26.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

Dimension "Y"
(Adjustment flange) 15.6 16.1

- 1) = Setting of overflow volume:
omitted.
- 2) = Start-of-delivery incipient
fissure on FB cyl. 8.
Tolerance +/- 0.10° NW.
- 3) = Setting of cam disk position:
omitted.
- 4) = U/actual value min.:
U/actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

Pump: PE 8 H 120/320 LS 3-1
 Regulator: RE 36
 IP-ASSEMBLY 0 402 698 032

TEST SHEET : 0 402 698 032
 Edition : 11.94 (1) EN
 Type number : 0 412 628 002
 Type number : 0 421 890 353
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MB
 Engine: OM 442 LA
 Output kW:
 at 1/min:

Min Max

Test PREREQUISITES

Test oil inlet temperature °C 38 42

Overflow valve 2 417 413 082

Inlet pressure bar 3.4 3.6

Overflow 1) l/h - -

Calibrating nozzle-holder assembly 1 688 901 105

Opening pressure bar 207 210

Perforated plate diameter mm - -

Test pressure line 1 680 750 089

Dimensions:
 Outer diameter mm 8.0
 x wall thickness mm 2.5
 x length mm 600

TEST SPECIFICATIONS

Section A -

Setting values of injection pump

- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	8	
Test pressure bar	30	32
Prestroke (from BDC)	mm	6.95 7.05
P Prestroke (from BDC)	mm	6.90 7.10
Control-rod travel	mm	10.0 11.0
Cam sequence	8-7-2-6-3-5-4-1	
PC difference °CS	45 each	
tolerance +/- °CS	0.15	
P tolerance +/- °CS	0.30	

Testoil-ISO 4113

	Min	Max
PC mark	Cyl.-No. 8 2)	
Nockenscheibe-Position (PC cam)	°CS	3)
Tolerance +/- °CS	--	--
P Tolerance +/- °CS	--	--

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value		
U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

U/actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Continued on next page

	Min	Max
--	-----	-----

S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	750
U/actual	V	2.800
Prestroke magnet -		
Magnet stroke mm		7.4
Fuel		
delivery	cm ³ /1000str	340.0 342.0
P Fuel		
delivery	cm ³ /1000str	337.0 345.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	300
U/actual	V	1.440 1.560
Prestroke magnet -		
Magnet stroke mm		8.0
Fuel		
delivery	cm ³ /1000str	20.0 26.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

Dimension "y"
(Adjustment flange) 15.6 16.1

- 1) = Setting of overflow volume:
omitted.
- 2) = Start-of-delivery incipient
fissure on FB cyl. 6.
Tolerance +/- 0.10° NW.
- 3) = Setting of cam disk position:
omitted.
- 4) = U/actual value min.:
U/actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

Testoil-ISO 4113

BOSCH

TEST SPECS. IP ASSEMBLY

Pump: PE 8 H 120/320 LS 3-2
 Regulator: RE 36
 IP-ASSEMBLY: 0 402 698 033

TEST SHEET : 0 402 698 033
 Edition : 11.94 (2) EN
 Type number : 0 412 628 003
 Type number : 0 421 890 353
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MB
 Engine: OM 442 LA
 Output kW: --
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	3.4	3.6
Overflow 1)	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 1051	
Opening pressure	bar	207	210
Perforated plate diameter	mm	--	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	8		
Test pressure bar	30	32	
P Prestroke (from BDC)	mm	6.95	7.05
P Prestroke (from BDC)	mm	6.90	7.10
Control-rod travel	mm	10.0	11.0
Cam sequence		8-7-2-6-3-5-4-1	
PC difference °CS		45 each	
tolerance +/- °CS		0.15	
P tolerance +/- °CS		0.30	

	Min	Max		
PC mark	Cyl.-No. 8	2)		
Nockenscheibe-Position	(PC cam)	°CS	- -	3)
Tolerance +/- °CS			- -	
P Tolerance +/- °CS			- -	

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Continued on next page

	Min	Max
--	-----	-----

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed 1/min 750
 U/actual V 2.800
 Prestroke magnet -
 Magnet stroke mm 7.4

Fuel

delivery cm³/1000str 340.0 342.0

P Fuel

delivery cm³/1000str 337.0 345.0Dispersion cm³/1000str 5.0P Dispersion cm³/1000str 9.0

Test point L1

Speed 1/min 300
 U/actual V 1.440 1.560

Prestroke magnet -

Magnet stroke mm 8.0

Fuel

delivery cm³/1000str 20.0 26.0Dispersion cm³/1000str 8.0P Dispersion cm³/1000str 12.0

REMARKS

Dimension "Y"
 (Adjustment flange) 15.6 16.1

1) = Setting of overflow volume:
 omitted.

2) = Start-of-delivery incipient
 fissure on FB cyl. 8.
 Tolerance +/- 0.10° NW.

3) = Setting of cam disk position:
 omitted.

4) = U/actual value min:
 U/actual minimum value with
 deenergized servo magnet and
 control rod in shutoff
 position.

BOSCH TEST SPECS. IP ASSEMBLY
 Pump: PE 8 P 120 A 920/4 LS 7149
 Regulator: RE 30
 IP-ASSEMBLY: 0 402 698 802

TEST SHEET : 0 402 698 802
Edition : 12.94 (7) EN
Type number : 0 412 628 826
Type number : 0 421 890 007
CUSTOMER IDENT. NO.:

Customer-specific details

Customer: SCANIA
 Engine: DSC 1404
 Output kW:
 at 1/min:

Min	Max
-----	-----

Test PREREQUISITES

Test oil inlet temperature °C 38 42

Overflow valve 1 417 413 025

Inlet pressure bar 1.4 1.6

Overflow l/h - -

Calibrating nozzle-holder assembly 1 688 901 019

Opening pressure bar 207 210

Perforated plate diameter mm 0.8

Test pressure line 1 680 750 015

Dimensions:

Outer diameter. mm 6.0
 x wall thickness mm 1.5
 x length mm 600

TEST SPECIFICATIONS

Section A -

Setting values of injection pump

- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	5.00	5.10
P Prestroke (from BDC)	mm	4.95	5.15
Control-rod travel	mm	9.0	12.0
Cam sequence	1-2-7-3-4-5-6-8		
PC difference °CS	45 each		
tolerance +/- °CS	0.30		
P tolerance +/- °CS	0.75		

TEST SHEET : 0 402 698 802
Edition : 12.94 (7) EN
Type number : 0 412 628 826
Type number : 0 421 890 007
CUSTOMER IDENT. NO.:

Min	Max
-----	-----

PC mark	Cyl.-No.	1	2)
Pulse wheel position	(PC cam)	°CS	0 3)
Tolerance +/- °CS			0.20
P Tolerance +/- °CS			0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value		
U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

U/actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60
pos. amplitude	V	0.8 2.0
P pos. amplitude	V	0.6 3.0

Speed	1/min	600
Difference		
Amplitude to		
Amplitude	V	max. 1.4

Continued on next page

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	Min	Max
--	-----	-----

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 5), .6))

Test point V1

Speed	1/min	700		
U/actual	V	3.180		
Fuel				
delivery	cm ³ /1000str	226.0	228.0	
P Fuel				
delivery	cm ³ /1000str	223.0	231.0	
Dispersion	cm ³ /1000str		6.0	
P Dispersion	cm ³ /1000str		9.0	

Test point L1

Speed	1/min	250		
U/actual	V	1.540	1.660	
Fuel				
delivery	cm ³ /1000str	15.0	21.0	
Dispersion	cm ³ /1000str		3.0	
P Dispersion	cm ³ /1000str		6.0	

REMARKS

SCANIA No.: 397 567

Dimension "y"
(Adjustment flange) 15.6 16.1
(If provided;
adjustment flange was
introduced in the course
of series production)

- 1) = Arrangement of pressure-relief valve:
Pump side 4.2 (previous: pump side 2 rear).
- 2) = Start of delivery mark at start of delivery of cylinder No 1.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

	Min	Max
--	-----	-----

REMARKS (Continued)

- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.
- 5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm:
Pump page 3.2
(previous: pump side 2).
- 6) = Delivery-valve holder:
 - * Valve spring pre-tension: mm 3.2 3.4
 - * Allowed variation: mm 3.0 3.5
 - * Required setting for new delivery-valve holders due to flattening: mm 2.9 3.1

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BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PE 8 P 120 A 920/4 LS 7205
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 698 804

TEST SHEET : 0 402 698 804
 Edition : 12.94 (6) EN
 Type number : 0 412 628 845
 Type number : 0 421 890 007
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: SCANIA
 Engine: DSC 1409, DSC 1416
 Output kW:
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature °C 38 42

Overflow valve 1 417 413 025

Inlet pressure bar 2.4 2.6

Overflow l/h - -

Calibrating nozzle-holder assembly 1 688 901 104

Opening pressure bar 250 253

Perforated plate diameter mm 0.7

Test pressure line 1 680 750 008

Dimensions:

Outer diameter. mm 6.0

x wall thickness mm 2.0

x length mm 600

TEST SPECIFICATIONS

Section A -

Setting values of injection pump

- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1	
Test pressure bar	25	27
Prestroke (from BDC)	mm 5.00	5.10
P Prestroke (from BDC)	mm 4.95	5.15
Control-rod travel	mm 10.0	11.0
Cam sequence	1-2-7-3-4-5-6-8	
PC difference °CS	45 each	
tolerance +/- °CS		0.50
P tolerance +/- °CS		0.75

	Min	Max
PC mark	Cyl.-No. 1 2)	
Pulse wheel position (PC cam)	°CS 0 3)	
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0	
Setting value	V 3.100	
U/actual	V	3.100
Control-rod travel	mm 12.95	13.05
P Control-rod travel	mm 12.90	13.10

Check value

U/actual	V 1.700	
Control-rod travel	mm 5.90	6.40
P Control-rod travel	mm 5.85	6.45

Stop position

U/actual	V mind. 4)	
Control-rod travel	mm 0.5	1.0
P Control-rod travel	mm 0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min 60	
pos. amplitude	V 0.8	2.0
P pos. amplitude	V 0.6	3.0

Speed	1/min 600	
Difference		
Amplitude to		
Amplitude	V max. 1.4	

Continued on next page

Testoil-ISO 4113

	Min	Max
--	-----	-----

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 5), 6))

Test point V1

Speed	1/min	700
U/actual	V	3.000
Fuel		
delivery	cm ³ /1000str	247.0 249.0
P Fuel		
delivery	cm ³ /1000str	244.0 252.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

Test point L1

Speed	1/min	250
U/actual	V	1.350 1.470
Fuel		
delivery	cm ³ /1000str	13.0 19.0
Dispersion	cm ³ /1000str	4.0
P Dispersion	cm ³ /1000str	8.0

REMARKS

SCANIA-No.: 1 328 039

Dimension "y"
(Adjustment flange) 15.6 16.1
(If provided;
adjustment flange was
introduced in the course
of series production)

- 1) = Arrangement of pressure-relief valve:
Pump side 4.2 (previous: pump side 2 rear).
- 2) = Start of delivery mark at start of delivery of cylinder No 1.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

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F12

	Min	Max
--	-----	-----

REMARKS (Continued)

- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.
- 5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm: Pump page 3.2 (previous: pump side 2).
- 6) = Pressure valve holder:
Setting of valve spring pretensioning omitted.

BOSCH TEST SPECS. IP ASSEMBLY
 Pump : PE 8 P 120 A 920/4 LS 7205
 Regulator: RE 30
 IP-ASSEMBLY: 0 402 698 805

TEST SHEET	:	0 402 698 805
Edition	:	12.94 (1) EN
Type number	:	0 412 628 845
Type number	:	0 421 890 019
CUSTOMER IDENT. NO.:		

Customer-specific details

Customer: SCANIA
 Engine: DSC 1409, DSC 1416
 Output kW:
 at 1/min:

Min	Max
-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 104	
Opening pressure	bar	250	253
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	5.00	5.10
P Prestroke (from BDC)	mm	4.95	5.15
Control-rod travel	mm	10.0	11.0
Cam sequence		1-2-7-3-4-5-6-8	
PC difference °CS		45 each	
tolerance +/- °CS		0.45	
P tolerance +/- °CS		0.75	

PC mark	Cyl.-No.	1 2)	Min	Max
Pulse wheel position	(PC cam)	°CS	0	3)
Tolerance +/- °CS			0.20	
P Tolerance +/- °CS			0.75	

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max.	1.4

Continued on next page

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SCA 0 402 698 805, page 2, (1) EN

(On our copy, revolution norm at test point L1 is missing).

Min Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 5), 6))

Test point V1

Speed	1/min	700
U/actual	V	3.000
Fuel		
delivery	cm ³ /1000str	247.0 249.0
P Fuel		
delivery	cm ³ /1000str	244.0 252.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

Test point L1

Speed	1/min	250
U/actual	V	1,350 1,470
Fuel		
delivery	cm ³ /1000str	13.0 19.0
Dispersion	cm ³ /1000str	4.0
P Dispersion	cm ³ /1000str	8.0

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REMARKS

SCANIA-No.: 1 361 306

Dimension "y"

(Adjustment flange) 15.6 16.1

1) = Arrangement of pressure-relief valve:
Pump side 4.2 (previous: pump side 2 rear).

2) = Start of delivery mark at start of delivery of cylinder No 1.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

Min Max

REMARKS (Continued)

4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm:
Pump page 3.2
(previous: pump side 2).

6) = Pressure valve holder:
Setting of valve spring pretensioning omitted.
1W8

Testoil-ISO 4113

BOSCH	TEST SPECS. IP ASSEMBLY	TEST SHEET : 0 402 698 806
Pump:	PE 8 P 120 A 920/4 LS 7331	Edition : 12.94 (1) EN
Regulator:	RE 30	Type number : 0 412 628 884
IP-ASSEMBLY:	0 402 698 806	Type number : 0 421 890 022
CUSTOMER IDENT. NO.:		

Customer-specific details

Customer: SCANIA
 Engine: DSC 1409, DSC 1416
 Output kW:
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature °C 38 42

Overflow valve 1 417 413 025

Inlet pressure bar 2.4 2.6

Overflow l/h - -

Calibrating nozzle-holder assembly 1 688 901 104

Opening pressure bar 250 253

Perforated plate diameter mm 0.7

Test pressure line 1 680 750 008

Dimensions:

Outer diameter. mm 6.0

x wall thickness mm 2.0

x length mm 600

TEST SPECIFICATIONS

Section A -

Setting values of injection pump

- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1	
Test pressure bar	25	27
Prestroke (from BDC)	mm 5.00	5.10
P Prestroke (from BDC)	mm 4.95	5.15
Control-rod travel	mm 10.0	11.0
Cam sequence	1-2-7-3-4-5-6-8	
PC difference °CS	45 each	
tolerance +/- °CS		0.50
P tolerance +/- °CS		0.75

	Min	Max
--	-----	-----

PC mark	Cyl.-No.	1	2)
Pulse wheel position	(PC cam)	°CS	0 3)
Tolerance +/- °CS			0.20
P Tolerance +/- °CS			0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0
Setting value	
U/actual	V 3.100
Control-rod travel	mm 12.95 13.05
P Control-rod travel	mm 12.90 13.10

Check value

U/actual	V 1.700
Control-rod travel	mm 5.90 6.40
P Control-rod travel	mm 5.85 6.45

Stop position

U/actual	V mind. 4)
Control-rod travel	mm 0.5 1.0
P Control-rod travel	mm 0.4 1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min 60
pos.amplitude	V 0.8 2.0
P pos.amplitude	V 0.6 3.0

Speed	1/min 600
-------	-----------

Difference	
Amplitude to	
Amplitude	V max. 1.4

Continued on next page

	Min	Max
--	-----	-----

S E C T I O N C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 5), 6))

Test point V1

Speed	1/min	700
U/actual	V	3.000
Fuel		
delivery	cm ³ /1000str	247.0 249.0
P Fuel		
delivery	cm ³ /1000str	244.0 252.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

Test point L1

Speed	1/min	250
U/actual	V	1.350 1.470
Fuel		
delivery	cm ³ /1000str	13.0 19.0
Dispersion	cm ³ /1000str	4.0
P Dispersion	cm ³ /1000str	8.0

REMARKS

SCANIA No.: 1 362 097

Dimension "y"
(Adjustment flange) 15.6 16.1

- 1) = Arrangement of pressure-relief valve:
Pump side 4.2 (previous: pump side 2 rear).
- 2) = Start of delivery mark at start of delivery of cylinder No 1.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

	Min	Max
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REMARKS (Continued)

- 5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm:
Pump page 3.2
(previous: pump side 2).
- 6) = Pressure valve holder:
Setting of valve spring pretensioning omitted.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PES 5 H 120/720/3 LS 1002
 Regulator : RE 33
 IP-ASSEMBLY: 0 402 795 201

TEST SHEET : 0 402 795 201
 Edition : 10.94 (1) EN
 Type number : 0 412 725 201
 Type number : 0 421 890 354
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MAN
 Engine: D 2865 LF 09
 Output kW: --
 at 1/min:

	Min	Max
--	-----	-----

TEST PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	--	--
Overflow 1)	l/h	160	170
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	--	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	5	
Test pressure bar	30	32
Prestroke (from BDC)	mm	9.94 10.04
P Prestroke (from BDC)	mm	9.89 10.09
Control-rod travel	mm	10.0 11.0
Cam sequence	1 - 3 - 5 - 4 - 2	
PC difference °CS	72 each	
tolerance +/- °CS		0.15
P tolerance +/- °CS		0.30

	Min	Max
PC mark Cyl.-No. - 2)		
Nockenscheibe-Position (PC cam)	°CS 0 3)	
Tolerance +/- °CS	0	0.10
P Tolerance +/- °CS	--	

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0	
Setting value U/actual	V 3.100	
Control-rod travel	mm 12.95 13.05	
P Control-rod travel	mm 12.90 13.10	

Check value

U/actual	V 1.700	
Control-rod travel	mm 5.90 6.40	
P Control-rod travel	mm 5.85 6.45	

Stop position

U/actual	V mind. 4)	
Control-rod travel	mm 0.5 1.0	
P Control-rod travel	mm 0.4 1.1	

Continued on next page

Testoil-ISO 4113

	Min	Max
--	-----	-----

S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	750
U/actual	V	3.350
Prestroke magnet -		
Magnet stroke	mm	10.0
Fuel		
delivery	cm ³ /1000str	331.0 333.0
P Fuel		
delivery	cm ³ /1000str	328.0 336.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	300
U/actual	V	1.460 1.580
Prestroke magnet -		
Magnet stroke	mm	7.2
Fuel		
delivery	cm ³ /1000str	27.0 33.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

Dimension "y"
(Adjustment flange) 15.6 16.1

- 1) = Setting of overflow at full load (refer to measurement point V1).
- 2) = No start-of-delivery mark.
- 3) = Setting of cam disk position: on FB cyl. 5.
- 4) = U/actual value min:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PES 6 H 120/720 LS 7
 Regulator: RE 36
 IP-ASSEMBLY 0 402 796 033

TEST SHEET : 0 402 796 033
 Edition : 11.94 (2) EN
 Type number : 0 412 726 004
 Type number : 0 421 890 356
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MB
 Engine: OM 447 LA
 Output kW: --
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	3.4	3.6
Overflow 1)	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	--	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING 2)

PC setting cyl.	6		
Test pressure bar	30	32	
Prestroke (from BDC)	mm	6.95	7.05
P Prestroke (from BDC)	mm	6.90	7.10
Control-rod travel	mm	10.0	11.0
Cam sequence	6 - 2 - 4 - 1 - 5 - 3		
PC difference °CS	60 each		
tolerance +/- °CS		0.15	
P tolerance +/- °CS		0.30	

	Min	Max	
PC mark	Cyl.-No.	6 2)	
Cam disk position	(PC cam)	°CS	3)
Tolerance +/- °CS			--
P Tolerance +/- °CS			--

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Continued on next page

Testoil-ISO 4113

	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed 1/min 800
U/actual V 2.650
Prestroke magnet -
Magnet stroke mm 9.0
Fuel
delivery cm³/1000str 301.0 303.0
P Fuel
delivery cm³/1000str 298.0 306.0
Dispersion cm³/1000str 5.0
P Dispersion cm³/1000str 9.0

Test point L1

Speed 1/min 300
U/actual V 1.380 1.500
Prestroke magnet -
Magnet stroke mm 9.0
Fuel
delivery cm³/1000str 22.0 28.0
Dispersion cm³/1000str 8.0
P Dispersion cm³/1000str 12.0

REMARKS

Dimension "Y"
(Adjustment flange) 15.6 16.1

- 1) = Setting of overflow volume:
omitted.
- 2) = Start-of-delivery incipient fissure on FB cyl. 6.
Tolerance +/- 0.30° NW.
- 3) = Setting of cam disk position:
omitted.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PE 6 H 120/320 RS 8
 Regulator: RE 36
 IP-ASSEMBLY: 0 402 796 034

TEST SHEET : 0 402 796 034
 Edition : 11.94 (1) EN
 Type number : 0 412 726 005
 Type number : 0 421 890 355
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MAN
 Engine: D 0826 LUH 11
 Output kW: 162
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	3.4	3.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	--	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	30	32	
Prestroke (from BDC)	mm	7.95	8.05
P Prestroke (from BDC)	mm	7.90	8.10
Control-rod travel	mm	10.0	11.0
Cam sequence	1 - 5 - 3 - 6 - 2 - 4		
PC difference °CS	60 each		
tolerance +/- °CS		0.15	
P tolerance +/- °CS		0.30	

	Min	Max
PC mark	Cyl.-No. 1 2)	
Cam disk position (PC cam)	°CS	0 3)
Tolerance +/- °CS		--
P Tolerance +/- °CS		--

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Continued on next page

Testoil-ISO 4113

	Min	Max
--	-----	-----

	Min	Max
--	-----	-----

S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1200
U/actual	V	2.540
Prestroke magnet -		
Magnet stroke mm 10.3		
Fuel		
delivery	cm ³ /1000str	208.0 210.0
P Fuel		
delivery	cm ³ /1000str	205.0 213.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	300
U/actual	V	1,380 1,500
Prestroke magnet -		
Magnet stroke mm 8.8		
Fuel		
delivery	cm ³ /1000str	12.0 18.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

Dimension "y"
(Adjustment flange) 15.6 16.1

- 1) = Setting of overflow volume:
omitted.
- 2) = Start-of-delivery incipient
fissure on FB cyl. 1.
Tolerance +/- 0.10° NW.
- 3) = Setting of cam disk position:
omitted.
- 4) = U/actual value min.:
U/actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

Testoil-ISO 4113

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY
 Pump: PES 6 H 120/720/3 LS 1001
 Regulator: RE 33
 IP-ASSEMBLY: 0 402 796 201

TEST SHEET : 0 402 796 201
 Edition : 11.94 (2) EN
 Type number : 0 412 726 201
 Type number : 0 421 890 354
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MAN
 Engine: D 2866 LF 14
 Output kW:
 at 1/min:

	Min	Max
--	-----	-----

Test prerequisites

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	--	--
Overflow 1)	l/h	160	170
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	--	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	

Test specifications

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

Port closing

PC setting cyl.	6		
Test pressure bar	30	32	
Prestroke (from BDC)	mm	9.94	10.04
P Prestroke (from BDC)	mm	9.89	10.09
Control-rod travel	mm	10.0	11.0
Cam sequence		6-2-4-1-5-3	
PC difference °CS	60 each		
tolerance +/- °CS		0.15	
P tolerance +/- °CS		0.30	

	Min	Max
PC mark	Cyl.-No. -	2)
Pulse wheel position	(PC cam)	°CS 0 3)
Tolerance +/- °CS		0.10
P Tolerance +/- °CS		--

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min Control-rod ca. 10 mm

Control-rod pickup setting

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Continued on next page

	Min	Max
--	-----	-----

	Min	Max
--	-----	-----

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 5))

Test point V1

Speed	1/min	750
U/actual	V	3.350

Prestroke magnet -

Magnet stroke mm	10.0
Fuel	
delivery cm ³ /1000str	331.0 333.0
P Fuel	
delivery cm ³ /1000str	328.0 336.0
Dispersion cm ³ /1000str	5.0
P Dispersion cm ³ /1000str	9.0

Test point L1

Speed	1/min	300
U/actual	V	1.460 1.580
Prestroke magnet -		
Magnet stroke mm	7.2	
Fuel		
delivery cm ³ /1000str	27.0 33.0	
Dispersion cm ³ /1000str	8.0	
P Dispersion cm ³ /1000str	12.0	

REMARKS

Dimension "y"
(Adjustment flange) 15.6 16.1

- 1) = Setting of overflow at full load (refer to measurement point V1).
- 2) = No start-of-delivery mark.
- 3) = Setting of cam disk position:
omitted: on FB cyl. 6.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PES 6 P 120 A 720 RS 7240
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 796 806

TEST SHEET : 0 402 796 806
 Edition : 12.94 (3) EN
 Type number : 0 412 726 855
 Type number : 0 421 890 013
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: IVECO - UNIC

Engine: 8460.41.5020

Output kW:

at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
----------------------------	----	----	----

Overflow valve		2 417 413 025	
----------------	--	---------------	--

Inlet pressure	bar	1.5	1.6
----------------	-----	-----	-----

Overflow	l/h	-	-
----------	-----	---	---

Calibrating nozzle-holder assembly		1 688 901 105	
------------------------------------	--	---------------	--

Opening pressure	bar	207	210
------------------	-----	-----	-----

Perforated plate diameter	mm	0.8	
---------------------------	----	-----	--

Test pressure line		1 680 750 015	
--------------------	--	---------------	--

Dimensions: Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump

- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	5.10	5.20
P Prestroke (from BDC)	mm	5.05	5.25
Control-rod travel	mm	9.0	12.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No.	- 2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value	V	3.100	
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0

Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max.	1.4

Continued on next page

Testoil-ISO 4113

G1

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1050
U/actual	V	2.900
Fuel		
delivery	cm ³ /1000str	235.0 237.0
P Fuel		
delivery	cm ³ /1000str	232.0 240.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	275
U/actual	V	1.520 1.640
Fuel		
delivery	cm ³ /1000str	32.0 38.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

REMARKS

Dimension "Y"
(Adjustment flange) 15.6 16.1

- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH

TEST SPECS. IP ASSEMBLY

Pump: PES 6 P 120 A 720 RS 7259
 Regulator: RE 30
 IP-ASSEMBLY 0 402 796 809

TEST SHEET:

DEE

Edition: 06.93 (1) EN

Type number: 0 412 726 863

Type number: 0 421 890 014

CUSTOMER IDENT. NO.:

Customer-specific details

Customer: JOHN DEERE
 Engine: 6101 HRW 11
 Output kW: 233
 at 1/min: 2100

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 077	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING 1)

PC setting cyl.	1		
Test pressure	bar	25	27
Prestroke			
(from BDC)	mm	3.55	3.65
P Prestroke			
(from BDC)	mm	3.50	3.70
Control-rod travel	mm	9.00	12.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

TEST SHEET:

DEE

Edition: 06.93 (1) EN

Type number: 0 412 726 863

Type number: 0 421 890 014

CUSTOMER IDENT. NO.:

	Min	Max
PC mark	Cyl.-No.	- 2)
Pulse wheel position	(PC cam)	°CS 0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0		
Setting value			
U/actual	V 3.100		
Control-rod travel			
P Control-rod travel	mm 12.95 13.05		
P Control-rod travel	mm 12.90 13.10		

Check value

U/actual	V 1.70		
Control-rod travel			
P Control-rod travel	mm 5.90 6.40		
P Control-rod travel	mm 5.85 6.45		

Stop position

U/actual	V mind. 4)		
Control-rod travel			
P Control-rod travel	mm 0.5 1.0		
P Control-rod travel	mm 0.4 1.1		

SPEED SENSOR SIGNALS

- Test with control rod in stop position			
Speed	1/min 60		
pos. amplitude	V 0.8 2.0		
P pos. amplitude	V 0.6 3.0		
Speed	1/min 600		
Difference			
Amplitude to			
Amplitude	V max. 1.4		

Continued on next page

Min Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1050
U/actual	V	2.840
Fuel		
delivery	cm ³ /1000str	212.0 214.0
P Fuel		
delivery	cm ³ /1000str	210.0 216.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	250
U/actual	V	1.530 1.650
Fuel		
delivery	cm ³ /1000str	23.0 29.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	10.0

REMARKS

JOHN DEERE : RE 42 302

Dimension "Y"
(Adjustment flange) 15.6 16.1

2) = Flow begin-incipient fissure
8.75 degrees NW after flow
begin cylinder 1.
Incipient fissure over clutch
and indicator.
Incipient fissure measured at
62...68 degrees to vertical
axis of pump.

3) = Setting of pulse-wheel
position at flow begin

4) = U/actual value min:
U/actual minimum value with
deenergized servo magnet and
control rod in shutoff
position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PES 6 P 120 A 720 RS 7315
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 796 812

TEST SHEET : 0 402 796 812
 Edition : 12.94 (1) EN
 Type number : 0 412 726 902
 Type number : 0 421 890 017
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: JOHN DEERE
 Engine: 6081 (8400 ROW)
 Output kW: 205
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 077	
Inlet pressure	bar	1.4	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No.	1 2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V

CONTROLC-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position			
Speed	1/min	60	
pos. amplitude	V	0.8	2.0
P pos. amplitude	V	0.6	3.0
Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max.	1.4

Continued on next page

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	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1050
U/actual	V	2.840
Fuel		
delivery	cm ³ /1000str	212.0 214.0
P Fuel		
delivery	cm ³ /1000str	209.0 217.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	450
U/actual	V	1.530 1.650
delivery	cm ³ /1000str	23.0 29.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	10.0

REMARKS

John Deere Nr.: RE 57 375
 Dimension "y"
 (Adjustment flange) 15.6 16.1

- 2) = Start-of-delivery - Incipient fissure 9.75 degrees NW after start-of-delivery cyl.1 Incipient fissure over coupling and pointer.
 Incipient fissure measured at 67...73 degrees from vertical axis of pump.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min.:
 U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY
 Pump : PES 6 P 120 A 720 RS 7356
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 796 813

TEST SHEET : 0 402 796 816
 Edition : 12.94 (1) EN
 Type number : 0 412 726 919
 Type number : 0 421 890 017
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: JOHN DEERE
 Engine: 6081 (8400 ROW)
 Output kW: 205
 at 1/min:

	Min	Max
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Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 077	
Inlet pressure	bar	1.4	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No. 1	2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0		
Setting value			
U/actual	V 3.100		
Control-rod travel			
P Control-rod travel	mm 12.95	13.05	
P Control-rod travel	mm 12.90	13.10	

Check value

U/actual	V 1.700		
Control-rod travel	mm 5.90	6.40	
P Control-rod travel	mm 5.85	6.45	

Stop position

U/actual	V mind. 4)		
Control-rod travel	mm 0.5	1.0	
P Control-rod travel	mm 0.4	1.1	

SPEED SENSOR SIGNALS

- Test with control rod in stop position			
Speed	1/min 60		
pos. amplitude	V 0.8	2.0	
P pos. amplitude	V 0.6	3.0	
Speed	1/min 600		
Difference			
Amplitude to			
Amplitude	V max. 1.4		

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	1050
U/actual	V	3.030
Fuel		
delivery	cm ³ /1000str	212.0 214.0
P Fuel		
delivery	cm ³ /1000str	209.0 217.0
Dispersion	cm ³ /1000str	5.0
P Dispersion	cm ³ /1000str	9.0

Test point L1

Speed	1/min	450
U/actual	V	1.680 1.800
delivery	cm ³ /1000str	23.0 29.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	10.0

REMARKS

John Deere-Nr.: RE 61 658
 Dimension "y"
 (Adjustment flange) 15.6 16.1

2) = Start-of-delivery - Incipient fissure 9.75 degrees NW after start-of-delivery cyl.1 Incipient fissure over coupling and pointer.
 Incipient fissure measured at 67...73 degrees from vertical axis of pump.

3) = Pulse wheel position 10.5° camshaft after port closing of cylinder 1.

4) = U/actual value min.:
 U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PE 6 P 120 A 720 RS 8010
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 896 004

TEST SHEET : 0 402 896 004
 Edition : 12.94 (5) EN
 Type number : 0 412 826 014
 Type number : 0 421 890 009
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: SCANIA
 Engine: DSC 1127 (Bus)
 Output kW:
 at 1/min:

	Min	Max
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Test prerequisites

Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 104	
Opening pressure	bar	250	253
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

Test specifications

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	25	27	
Prestroke (from BDC)	mm	2.75	2.85
P Prestroke (from BDC)	mm	2.70	2.90
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.50	
P tolerance +/- °CS		0.75	

Testoil-ISO 4113

	Min	Max
PC mark Cyl.-No.	1	2
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position
 Speed 1/min 60
 pos.amplitude V 0.8 2.0
 P pos.amplitude V 0.6 3.0

Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max.	1.4

Continued on next page

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 5), 6)).

Test point V1

Speed	1/min	700
U/actual	V	3.500
Fuel		
delivery	cm ³ /1000str	331.0 333.0
P Fuel		
delivery	cm ³ /1000str	328.0 336.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

Test point L1

Speed	1/min	250
U/actual	V	1.660 1.780
Fuel		
delivery	cm ³ /1000str	13.0 19.0
Dispersion	cm ³ /1000str	4.0
P Dispersion	cm ³ /1000str	8.0

REMARKS

SCANIA-No.: 1 328 145

Dimension "y"
(Adjustment flange) 15.6 16.1

- 1) = Arrangement of pressure-relief valve:
Pump side 4.2 (previous: pump side 2 rear).
- 2) = Start of delivery mark at start of delivery of cylinder No 1.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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	Min	Max
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REMARKS (Continued)

- 5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm: Pump page 3.1 (previous: pump side 1).
- 6) = Pressure valve holder: Setting of valve spring pretensioning omitted.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PE 6 P 120 A 720 RS 8025
 Regulator: RE 30
 IP-ASSEMBLY: 0 402 896 013

TEST SHEET : 0 402 896 013
 Edition : 12.94 (1) EN
 Type number : 0 412 826 026
 Type number : 0 421 890 019
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: SCANIA

Engine: DSC 1124 (BUS)

Output kW:

at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature °C 38 42

Overflow valve 1 417 413 025

Inlet pressure bar 2.4 2.6

Overflow l/h 220 260

Calibrating nozzle-holder assembly 1 688 901 104

Opening pressure bar 250 253

Perforated plate diameter mm 0.7

Test pressure line 1 680 750 008

Dimensions:

Outer diameter. mm 6.0

x wall thickness mm 2.0

x length mm 600

TEST SPECIFICATIONS

Section A -

Setting values of injection pump

- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1	
Test pressure bar	25	27
Prestroke (from BDC)	mm 2.80	2.90
P Prestroke (from BDC)	mm 2.75	2.95
Control-rod travel	mm 10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4		
PC difference °CS	60 each	
tolerance +/- °CS		0.50
P tolerance +/- °CS		0.75

	Min	Max
PC mark Cyl.-No.	1	3)
Pulse wheel position (PC cam)	°CS 0	4)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0	
Setting value		
U/actual	V 3.100	
Control-rod travel	mm 12.95	13.05
P Control-rod travel	mm 12.90	13.10

Check value

U/actual	V 1.700	
Control-rod travel	mm 5.90	6.40
P Control-rod travel	mm 5.85	6.45

Stop position

U/actual	V mind. 5)	
Control-rod travel	mm 0.5	1.0
P Control-rod travel	mm 0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min 60	
pos.amplitude	V 0.8	2.0

P pos.amplitude	V 0.6	3.0
-----------------	-------	-----

Speed	1/min 600	
Difference		
Amplitude to		
Amplitude	V max. 1.4	

Continued on next page

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SCA 0 402 896 013, page 2, (1) EN

(On our copy, revolution norm at test point L1 is missing).

Min Max

S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 6), 7))

Test point V1

Speed	1/min	700
U/actual	V	3.500
Fuel		
delivery	cm ³ /1000str	339.0 341.0
P Fuel		
delivery	cm ³ /1000str	336.0 344.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

Test point L1

Speed	1/min	250
U/actual	V	1,580 1,700
Fuel		
delivery	cm ³ /1000str	13.0 19.0
Dispersion	cm ³ /1000str	4.0
P Dispersion	cm ³ /1000str	8.0

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REMARKS

SCANIA-No.: 1 361 124

Dimension "y"
(Adjustment flange) 15.6 16.1

- 1) = Arrangement of pressure-relief valve:
Pump side 4.2 (previous: pump side 2 rear).
- 2) = Setting of overflow at full load (refer to measurement point V1).
- 3) = Start of delivery mark at start of delivery of cylinder No 1.

=====
Min Max
=====

REMARKS (Continued)

- 4) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 5) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.
- 6) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm:
Pump page 3.1
(previous: pump side 1).
- 7) = Pressure valve holder:
Setting of valve spring pretensioning omitted.

BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PE 6 P 120 A 720 RS 8029
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 896 014

TEST SHEET : 0 402 896 014
 Edition : 12.94 (1) EN
 Type number : 0 412 626 028
 Type number : 0 421 890 021
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: SCANIA
 Engine: DSC 1124, (BUS, NKW)
 Output kW:
 at 1/min:

	Min	Max
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Test PREREQUISITES

Test oil inlet temperature °C 38 42

Overflow valve 1 417 413 025

Inlet pressure bar 2.4 2.6

Overflow l/h 220 260

Calibrating nozzle-holder assembly 1 688 901 104

Opening pressure bar 250 253

Perforated plate diameter mm 0.7

Test pressure line 1 680 750 008

Dimensions:
 Outer diameter. mm 6.0

x wall thickness mm 2.0

x length mm 600

TEST SPECIFICATIONS

Section A -

Setting values of injection pump

- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1	
Test pressure bar	25	27
Prestroke (from BDC)	mm	2.80 2.90
P Prestroke (from BDC)	mm	2.75 2.95
Control-rod travel	mm	10.0 11.0
Cam sequence		1-5-3-6-2-4
PC difference °CS	60 each	
tolerance +/- °CS		0.50
P tolerance +/- °CS		0.75

	Min	Max
PC mark	Cyl.-No. 1 3)	
Pulse wheel position (PC cam)	°CS 0 4)	
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min 0	
Setting value		
U/actual	V 3.100	
Control-rod travel	mm 12.95 13.05	
P Control-rod travel	mm 12.90 13.10	

Check value

U/actual	V 1.700	
Control-rod travel	mm 5.90 6.40	
P Control-rod travel	mm 5.85 6.45	

Stop position

U/actual	V mind. 5)	
Control-rod travel	mm 0.5 1.0	
P Control-rod travel	mm 0.4 1.1	

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min 60	
pos.amplitude	V 0.8 2.0	
P pos.amplitude	V 0.6 3.0	

Speed	1/min 600	
Difference		
Amplitude to		
Amplitude	V max. 1.4	

Continued on next page

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	Min	Max
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S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 6), 7))

Test point V1

Speed	1/min	700
U/actual	V	3.500
Fuel		
delivery	cm ³ /1000str	339.0 341.0
P Fuel		
delivery	cm ³ /1000str	336.0 344.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	12.0

Test point L1

Speed	1/min	250
U/actual	V	1.580 1.700
Fuel		
delivery	cm ³ /1000str	13.0 19.0
Dispersion	cm ³ /1000str	4.0
P Dispersion	cm ³ /1000str	8.0

REMARKS

SCANIA-No.: 1 361 124

Dimension "y"
(Adjustment flange) 15.6 16.1

- 1) = Arrangement of pressure-relief valve:
Pump side 4.2 (previous: pump side 2 rear).
- 2) = Setting of overflow at full load (refer to measurement point V1).
- 3) = Start of delivery mark at start of delivery of cylinder No 1.
- 4) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

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REMARKS (Continued)

- 5) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.
- 6) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm: Pump page 3.1 (previous: pump side 2).
- 7) = Pressure valve holder:
Setting of valve spring pretensioning omitted.

BOSCH TEST SPECS. IP ASSEMBLY
 Pump: PES 6 P 120 A 720 RS 8505
 Regulator: RE 30
 IP-ASSEMBLY: 0 402 996 302

TEST SHEET	:	0 402 996 302
Edition	:	12.94 (1) EN
Type number	:	0 412 926 204
Type number	:	0 421 890 015
CUSTOMER IDENT. NO.:		

Customer-specific details

Customer: MACK
 Engine: E 7 - 450
 Output kW:
 at 1/min:

Min	Max
-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 084	
Inlet pressure	bar	2.4	2.6
Overflow 1)	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORt CLOSING

PC setting cyl.	1		
Test pressure bar	22	24	
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	11.8	12.2
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.30	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark	Cyl.-No.	- 2)
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.50

Section B -

Actuator test

- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0
Setting value		
U/actual	V	3.100
Control-rod travel	mm	12.95 13.05
P Control-rod travel	mm	12.90 13.10

Check value

U/actual	V	1.700
Control-rod travel	mm	5.90 6.40
P Control-rod travel	mm	5.85 6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60
pos. amplitude	V	0.8 2.0
P pos. amplitude	V	0.6 3.0

Speed	1/min	600
Difference		
Amplitude to		
Amplitude	V	max. 1.4

Continued on next page

Testoil-ISO 4113

	Min	Max
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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	900
U/actual	V	3.280
Fuel		
delivery	cm ³ /1000str	364.0 366.0
P Fuel		
delivery	cm ³ /1000str	361.0 369.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	14.0

Test point L1

Speed	1/min	325
U/actual	V	1.240 1.360
Fuel		
delivery	cm ³ /1000str	27.0 33.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	14.0

REMARKS

MACK-No.: 313 GC 5205-P3

Dimension "y"
(Adjustment flange) 15.6 15.9

- 1) = Setting of overflow volume at full load omitted
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH

TEST SPECS. IP ASSEMBLY

Pump : PES 6 P 120 A 720 RS 8509
 Regulator: RE 30
 IP-ASSEMBLY 0 402 996 303

TEST SHEET : 0 402 996 303
 Edition : 12.94 (1) EN
 Type number : 0 412 926 205
 Type number : 0 421 890 023
 CUSTOMER IDENT. NO.:

Customer-specific details

Customer: MACK
 Engine: E 7 - 400
 Output kW: --
 at 1/min:

	Min	Max
--	-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 084	
Inlet pressure	bar	2.4	2.6
Overflow 1)	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	22	24	
Prestroke (from BDC)	mm	4.55	4.65
P Prestroke (from BDC)	mm	4.50	4.70
Control-rod travel	mm	11.8	12.2
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.30	
P tolerance +/- °CS		0.75	

	Min	Max
PC mark Cyl.-No. - 2)		
Pulse wheel position (PC cam)	°CS	0 3)
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.50

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual Control-rod travel	V	mind.	4)
P Control-rod travel	mm	0.5	1.0

SPEED SENSOR SIGNALS

- Test with control rod in stop position
 Speed 1/min 60
 pos.amplitude V 0.8 2.0
 P pos.amplitude V 0.6 3.0
 Speed 1/min 600
 Difference
 Amplitude to
 Amplitude V max. 1.4

Continued on next page

Testoil-ISO 4113

	Min	Max
--	-----	-----

S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	900
U/actual	V	3.050
Fuel		
P	delivery	cm ³ /1000str 309.0 311.0
Fuel	delivery	cm ³ /1000str 306.0 314.0
	Dispersion	cm ³ /1000str 8.0
P	Dispersion	cm ³ /1000str 14.0

Test point L1

Speed	1/min	325
U/actual	V	1.250 1.370
Fuel		
P	delivery	cm ³ /1000str 30.0 36.0
	Dispersion	cm ³ /1000str 6.0
P	Dispersion	cm ³ /1000str 14.0

REMARKS

MACK-No.: 313 GC 5205-P3

Dimension "y"
 (Adjustment flange) 15.6 15.9

- 1) = Setting of overflow volume at full load omitted
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min.:
 U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY
 Pump : PES 6 P 120 A 720 RS 8510
 Regulator : RE 30
 IP-ASSEMBLY: 0 402 996 304

TEST SHEET	:	0 402 996 304
Edition	:	12.94 (1) EN
Type number	:	0 412 926 206
Type number	:	0 421 890 023
CUSTOMER IDENT. NO.:		

Customer-specific details

Customer: MACK
 Engine: E 7-450
 Output kW: --
 at 1/min:

Min	Max
-----	-----

Test PREREQUISITES

Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 084	
Inlet pressure	bar	2.9	3.1
Overflow 1)	l/h	--	--
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
 - Check values denoted by "P"
 - No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.	1		
Test pressure bar	22	24	
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	11.8	12.2
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS	60 each		
tolerance +/- °CS		0.30	
P tolerance +/- °CS			0.75

Min	Max
-----	-----

PC mark	Cyl.-No.	-	2)
Pulse wheel position (PC cam)	°CS	0	3)
Tolerance +/- °CS			0.20
P Tolerance +/- °CS			0.50

Section B -

Actuator test
 - Check values denoted by "P"
 - Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value	V	3.100	
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10

Check value

U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45

Stop position

U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference			
Amplitude to			
Amplitude	V	max.	1.4

Continued on next page

Testoil-ISO 4113

	Min	Max
--	-----	-----

S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

Speed	1/min	900
U/actual	V	3.280
Fuel		
delivery	cm ³ /1000str	364.0 366.0
P Fuel		
delivery	cm ³ /1000str	361.0 369.0
Dispersion	cm ³ /1000str	8.0
P Dispersion	cm ³ /1000str	14.0

Test point L1

Speed	1/min	325
U/actual	V	1.240 1.360
Fuel		
delivery	cm ³ /1000str	27.0 33.0
Dispersion	cm ³ /1000str	6.0
P Dispersion	cm ³ /1000str	14.0

REMARKS

MACK-No.: 313 GC 5205-P3

Dimension "y"
(Adjustment flange) 15.6 15.9

- 1) = Setting of overflow volume at full load omitted
- 2) = No start-of-delivery mark.
- 3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.
- 4) = U/actual value min:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture :
 Edition : 25.10.1995
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE4/10E2250R590-1

 Type No. : 0 460 404 982
 Customer Ident.No. :

 Customer-specific details
 Customer : VW

 Engine : 1.9 TDI USA

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

 Inlet pressure, bar: 0.30...0.40

 Calibrating nozzle-holder assembly > : 1 688 901 114

 Opening pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 018

 Test line : 0 986 612 439
 (fuel-delivery actuator): (KDEP 1865/10)

 Test line : 0 986 611 983
 (solenoid valve start of injection): (KDEP 1190)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer : 55

 Test oil supply temperature > °C : 42...47

 Hold-up revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator
 Connections 5 and 6
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

 Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground, Mohms min. : 1.0
 Connections 3 and 5 Mohms min. : 1.0
 Connections 5 and 7 Mohms min. : 1.0

 High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2
 Ohms : 4.9...6.5
 Connections 2 and 3
 Ohms : 4.9...6.5
 Connections 1 and 3
 Ohms : 9.8...13.0

 Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

 Temperature sensor, fuel
 Conventions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

 Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0

 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

 Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2450

Setting value, bar : 7.6...8.4

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2450

Setting value, mm : 9.7...9.9

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2420

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 37.2...37.6

Dispersion cm³/ : 2,5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000

Checkbk. volt

mV : 4000

Supply pump

pressure > bar : 9.9...10.9

> bar :

2st speed 1/min : 300

Checkbk. volt

mV : 2450

Supply pump

pressure > bar : 6.6...8.0

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2450

Timing device

travel mm :
> mm : (8.8...10.8)

2nd speed 1/min : 2000

Checkbk. volt. mV : 4000

Timing device

travel mm : 11.8...12.6
> mm : (11.4...13.0)

3rd speed 1/min : 1400

Checkbk. volt. mV : 1310

Timing device

travel mm : max. 0.5
> mm : (max. 0.8)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 300

Checkbk. volt. mV : 2450

Timing device

travel mm : 6.6...9.6
> mm : (6.1...10.1)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2000

Checkbk. volt. mV : 3890

Measuring

temperature °C : 53

Overflow : 96...150

> cm³/10s : (83...165)

Fuel delivery variations:

1st temperature-conditioning
 revolution 1/min : 100
 Checkbk. volt mV : 2500
 Output
 temperature °C : 51
 Speed 1/min : 2000
 Checkbk. volt mV : 4000
 Meßtemperatur °C : 53
 Fuel delivery cm³/ : 54.9...57.3
 > 1000s : (54.3...57.9)
 Dispersion cm³/ : 2.5
 > 1000s. :

2nd temperature-conditioning

revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 60
 Speed 1/min : 1000
 Checkbk. volt mV : 3210
 Measuring
 temperature °C : 56
 Fuel delivery cm³/ : 52.8...55.2
 > 1000s : (52.2...55.8)
 Dispersion cm³/ : 2.5
 > 1000s :

3rd temperature-conditioning

revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 60
 Speed 1/min : 1000
 Checkbk. volt mV : 2000
 Measuring
 temperature °C : 56
 Fuel delivery cm³/ : 23.7...25.7
 > 1000s : (23.2...26.2)
 Dispersion cm³/ : 2.50
 > 1000s :

4th temperature-conditioning

revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 500
 Checkbk. volt mV : 2450
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ : 43.8...46.4
 > 1000s : (43.3...46.9)
 Dispersion cm³/ : 3.0
 > 1000s :

Idle delivery:

1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 400
 Checkbk. volt mV : 1550
 Meßtemperatur °C : 57
 Fuel delivery cm³/ : 7.3...11.3
 > 1000s : (6.3...12.3)
 Solenoid valve
 Start of
 injection, volts : 12
 Dispersion cm³/ : 4.0
 > 1000s :

Starting fuel delivery:

1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 65
 Speed 1/min : 100
 Checkbk. volt mV : 2310
 Measuring
 temperature °C : 61
 Fuel delivery cm³/ : 37.0...47.0
 > 1000s : (34.0...50.0)

Solenoid valve

Start of
 injection, volts : 12

Stop test:

Speed 1/min : 750
 Checkbk. volt mV : 3650
 ELAB volts : 0
 Fuel delivery cm³/ :
 max. 1000s : 3.0
 Start of

Shutoff solenoid:

Cut-in voltage
 min. > volts : 10.0
 Rated voltage,
 volts : 12.0

Notes:

High-pressure compressor sensor
 Testing only possible with ballast
 EPS 910

Take note of test instructions
 "Distributor pump for direct
 injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:
TS		:
		: 1 467 010 410

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture:
 Edition : 25.10.1995
 Replaces:
 Test oil : ISO 4113
 Injection pump : VE4/10E2075R638
 Type No. : 0 460 404 986
 Customer Ident.No. :

Customer-specific details
 Customer : VW

Engine : 1.9 TDI EDC
 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar: 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 114

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 439
 (fuel-delivery actuator): (KDEP 1865/10)Test line : 0 986 611 983
 (solenoid valve start of injection): (KDEP 1190)

TEST PRECONDITIONS

Test oil
 return temp. > °C
 with thermometer : 55

Test oil supply
 temperature > °C : 42...47

Hold-up
 revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator

Connections 5 and 6

Test temperature:

15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground, Mohms min. : 1.0
 Connections 3 and 5 Mohms min. : 1.0
 Connections 5 and 7 Mohms min. : 1.0

High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2 Ohms : 4.9...6.5
 Connections 2 and 3 Ohms : 4.9...6.5
 Connections 1 and 3 Ohms : 9.8...13.0

Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
 Connections 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2560

Setting value, bar : 8.1...8.9

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2560

Setting value, mm : 10.1...10.3

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2480

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 34.7...35.1

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2050

Checkbk. volt

mV : 3890

Supply pump

pressure > bar : 10.5...11.5
> bar :

2st speed 1/min : 300

Checkbk. volt

mV : 2560

Supply pump

pressure > bar : 6.8...8.2
> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2560

Timing device

travel mm :
> mm : (9.2...11.2)

2nd speed 1/min : 2050

Checkbk. volt. mV : 3890

Timing device

travel mm : 11.9...12.7
> mm : (11.5...13.1)

3rd speed 1/min : 1500

Checkbk. volt. mV : 1500

Timing device

travel mm : max. 0.5
> mm : (max. 0.8)

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 300

Checkbk. volt. mV : 2560

Timing device

travel mm : 6.5...10.5
> mm : (5.5...11.5)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2050

Checkbk. volt. mV : 3890

Measuring

temperature °C : 53

Overflow : 123...205

> cm³/10 : (109...219)

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2050
Checkbk. volt mV : 3890
Meßtemperatur °C : 53
Fuel delivery cm³/ : 49.3...51.7
 > 1000s : (48.7...52.3)
Dispersion cm³/ : 2.5
 > 1000s. :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3350
Measuring
temperature °C : 56
Fuel delivery cm³/ : 53.1...55.5
 > 1000s : (52.8...55.8)
Dispersion cm³/ : 2.5
 > 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
 > 1000s : (33.6...36.2)
Dispersion cm³/ : 2,50
 > 1000s :

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2560
Measuring
temperature °C : 57
Fuel delivery cm³/ : 42.0...44.6
 > 1000s : (41.3...45.3)
Dispersion cm³/ : 3,0
 > 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1800
Meßtemperatur °C : 57
Fuel delivery cm³/ : 8.7...12.7
 > 1000s : (7.7...13.7)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
 > 1000s :

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2420
Measuring
temperature °C : 61
Fuel delivery cm³/ : 35.7...45.7
 > 1000s : (32.7...48.7)

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 1000
Checkbk. volt mV : 4000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Start of

Shutoff solenoid:

Cut-in voltage
min. > volts : 10.0
Rated voltage,
 volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	: 3.6...3.8
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture :
 Edition : 25.10.1995
 Replaces :
 Test oil : ISO 4113
 Injection pump : VE4/10E2250R640
 Type No. : 0 460 404 987
 Customer Ident.No. :

Customer-specific details
 Customer : VW

Engine : 1.9 SDI EDC
 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar: 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 114

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 439
 (fuel-delivery actuator) : (KDEP 1865/10)

Test line : 0 986 611 983
 (solenoid valve start of injection) : (KDEP 1190)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer : 55

Test oil supply temperature > °C : 42...47

Hold-up revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator

Connections 5 and 6

Test temperature:

15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground, Mohms min. : 1.0
 Connections 3 and 5 Mohms min. : 1.0
 Connections 5 and 7 Mohms min. : 1.0

High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2 Ohms : 4.9...6.5
 Connections 2 and 3 Ohms : 4.9...6.5
 Connections 1 and 3 Ohms : 9.8...13.0

Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
 Connentions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2360

Setting value, bar : 6.1...6.5

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2360

Setting value, mm : 10.6...10.8

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 800

Checkbk. volt

mV : 2550

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 34.6...35.0

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100

Checkbk. volt

mV : 3370

Supply pump

pressure > bar : 8.7...9.3
> bar : (8.5...9.5)

2st speed 1/min : 300

Checkbk. volt

mV : 2360

Supply pump

pressure > bar : 5.4...6.6
> bar : (5.2...6.8)

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2360

Timing device

travel mm :
> mm : (9.7...11.7)

2nd speed 1/min : 2100

Checkbk. volt. mV : 3370

Timing device

travel mm : 11.8...12.4
> mm : (11.4...13.0)

3rd speed 1/min : 2100

Checkbk. volt. mV : 1400

Timing device

travel mm : max. 3.0
> mm : (max. 4.0)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 300

Checkbk. volt. mV : 2360

Timing device

travel mm : 8.6...11.0
> mm : (8.2...11.4)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2100

Checkbk. volt. mV : 3370

Measuring

temperature °C : 53

Overflow : 109...164

> cm³/10 : (82...193)

Fuel delivery variations:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt mV : 2500

Output

temperature °C : 51

Speed 1/min : 2100

Checkbk. volt mV : 3370

Meßtemperatur °C : 53

Fuel delivery cm³/ : 36.4...38.8

> 1000s : (35.8...39.4)

Dispersion cm³/ : 2.5

> 1000s. :

2nd temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 60
 Speed 1/min : 1100
 Checkbk. volt mV : 2770
 Measuring
 temperature °C : 56
 Fuel delivery cm³/ : 34.4...36.8
 > 1000s : (33.8...37.4)
 Dispersion cm³/ : 2.5
 > 1000s :

 3rd temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 60
 Speed 1/min : 1100
 Checkbk. volt mV : 2160
 Measuring
 temperature °C : 56
 Fuel delivery cm³/ : 23.5...25.5
 > 1000s : (23.0...26.0)
 Dispersion cm³/ : 2.50
 > 1000s :

 4th temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 800
 Checkbk. volt mV : 2550
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ :
 > 1000s : (33.5...36.1)
 Dispersion cm³/ : 2.5
 > 1000s :

 5th temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 500
 Checkbk. volt mV : 2360
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ : 35.7...38.3
 > 1000s : (35.2...38.8)
 Dispersion cm³/ : 3.0
 > 1000s :

Idle delivery:
 1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 400
 Checkbk. volt mV : 1640
 Meßtemperatur °C : 57
 Fuel delivery cm³/ : 6.0...10.0
 > 1000s : (5.0...11.0)
 Solenoid valve
 Start of
 injection, volts : 12
 Dispersion cm³/ : 4.0
 > 1000s :

 Starting fuel delivery:
 1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 65
 Speed 1/min : 100
 Checkbk. volt mV : 2730
 Measuring
 temperature °C : 61
 Fuel delivery cm³/ : 43.0...53.0
 > 1000s : (40.0...51.0)
 Solenoid valve
 Start of
 injection, volts : 12

 Stop test:
 Speed 1/min : 750
 Checkbk. volt mV : 3650
 ELAB volts : 0
 Fuel delivery cm³/ :
 max. 1000s : 3.0
 Start of

 Shutoff solenoid:
 Cut-in voltage
 min. > volts : 10.0
 Rated voltage,
 volts : 12.0

 Notes:
 High-pressure compressor sensor
 Testing only possible with ballast
 EPS 910

 Take note of test instructions
 "Distributor pump for direct
 injectors"!

 Dimensions for mounting and setting:

 Description
 K mm :
 KF mm : 6.2...6.6
 SVS max. mm :
 FH mm :
 TS : 1 467 010 410

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture:
 Edition : 25.10.1995
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE4/10E2250R600

 Type No. : 0 460 404 989
 Customer Ident.No. :

 Customer-specific details
 Customer : VW

 Engine : 1.9 SDI EDC

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

 Inlet pressure, bar: 0,30...0,40

 Calibrating nozzle-
 holder assembly > : 1 688 901 114

 Opening
 pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 018

 Test line : 0 986 612 439
 (fuel-delivery
 actuator) : (KDEP 1865/10)

 Test line : 0 986 611 983
 (solenoid valve
 start of injection): (KDEP 1190)

TEST PRECONDITIONS

 Test oil
 return temp. > °C
 with thermometer : 55

 Test oil supply
 temperature > °C : 42...47

 Hold-up
 revolutions >1/min : 1200
 Feedback
 voltage mV : 2500

Actuator
 Connections 5 and 6
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

 Connections 5 and.
 ground, Mohms min. : 1.0
 Connections 6 and
 ground, Mohms min. : 1.0
 Connections 3 and 5
 Mohms min. : 1.0
 Connections 5 and 7
 Mohms min. : 1.0

 High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2
 Ohms : 4.9...6.5
 Connections 2 and 3
 Ohms : 4.9...6.5
 Connections 1 and 3
 Ohms : 9.8...13.0

 Connections 1 and.
 ground, Mohms min. : 1.0
 Connections 2 and
 ground, Mohms min. : 1.0
 Connections 3 and
 ground, Mohms min. : 1.0

 Temperature sensor, fuel
 Connetions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

 Connections 4 and
 grcund, Mohms min. : 1.0
 Connections 7 and
 ground Mohms min. : 1.0

 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

 Starting stop mV : 4120...4650

 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2360

Setting value, bar : 6.2...6.6

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2360

Setting value, mm : 10.6...10.8

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 800

Checkbk. volt

mV : 2550

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 34.6...35.0

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100

Checkbk. volt

mV : 3370

Supply pump

pressure > bar : 8.7...9.3
> bar : (8.5...9.5)

2st speed 1/min : 300

Checkbk. volt

mV : 2360

Supply pump

pressure > bar : 5.4...6.6
> bar : (5.2...6.8)

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2360

Timing device

travel mm :
> mm : (9.7...11.7)

2nd speed 1/min : 2100

Checkbk. volt. mV : 3370

Timing device

travel mm : 11.8...12.4
> mm : (11.4...13.0)

3rd speed 1/min : 2100

Checkbk. volt. mV : 1400

Timing device

travel mm : max. 3.0
> mm : (max. 4.0)

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 300

Checkbk. volt. mV : 2360

Timing device

travel mm : 8.6...11.0
> mm : (8.2...11.4)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2100

Checkbk. volt. mV : 3370

Measuring

temperature °C : 53

Overflow : 96...150

> cm³/10 : (82...164)

Fuel delivery variations:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt mV : 2500

Output

temperature °C : 51

Speed 1/min : 2100

Checkbk. volt mV : 3370

Meßtemperatur °C : 53

Fuel delivery cm³/ : 36.4...38.7

> 1000s : (35.7...39.3)

Dispersion cm³/ : 2.5

> 1000s. :

2nd temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 60
 Speed 1/min : 1100
 Checkbk. volt mV : 2770
 Measuring
 temperature °C : 56
 Fuel delivery cm³/ : 34.6...37.0
 > 1000s : (34.0...37.6)
 Dispersion cm³/ : 2.5
 > 1000s :

 3rd temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 60
 Speed 1/min : 1100
 Checkbk. volt mV : 2160
 Measuring
 temperature °C : 56
 Fuel delivery cm³/ : 23.5...25.5
 > 1000s : (23.0...26.0)
 Dispersion cm³/ : 2.50
 > 1000s :

 4th temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 800
 Checkbk. volt mV : 2550
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ :
 > 1000s : (33.5...36.1)
 Dispersion cm³/ : 2.5
 > 1000s :

 5th temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 500
 Checkbk. volt mV : 2360
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ : 35.7...38.3
 > 1000s : (35.2...38.8)
 Dispersion cm³/ : 3.0
 > 1000s :

Idle delivery:
 1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 400
 Checkbk. volt mV : 1640
 Meßtemperatur °C : 57
 Fuel delivery cm³/ : 6.5...10.5
 > 1000s : (5.5...11.5)
 Solenoid valve
 Start of
 injection, volts : 12
 Dispersion cm³/ : 4.0
 > 1000s :

 Starting fuel delivery:
 1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 65
 Speed 1/min : 100
 Checkbk. volt mV : 2730
 Measuring
 temperature °C : 61
 Fuel delivery cm³/ : 45.0...55.0
 > 1000s : (42.0...58.0)
 Solenoid valve
 Start of
 injection, volts : 12

 Stop test:
 Speed 1/min : 750
 Checkbk. volt mV : 3650
 ELAB volts : 0
 Fuel delivery cm³/ :
 max. 1000s : 3.0
 Start of

 Shutoff solenoid:
 Cut-in voltage
 min.> volts : 10.0
 Rated voltage,
 volts : 12.0

 Notes:
 High-pressure compressor sensor
 Testing only possible with ballast
 EPS 910

 Take note of test instructions
 "Distributor pump for direct
 injectors"!

 Dimensions for mounting and setting:

 Description
 K mm :
 KF mm :
 SVS max. mm :
 FH mm :

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture:
 Edition : 25.10.1995
 Replaces :
 Test oil : ISO 4113

Injection pump : VE4/11E2250R590

Type No. : 0 460 404 990
 Customer Ident.No. :

Customer-specific details
 Customer : VW

Engine : 1.9 TDI USA

Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0,30...0,40

Calibrating nozzle-
holder assembly > : 1 688 901 114

Opening
pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6,00
 x wall thickness > : 2,20
 x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 439
 (fuel-delivery actuator): KDEP 1865/10Test line : 0 986 611 983
 (solenoid valve
start of injection): KDEP 1190

TEST PRECONDITIONS

Test oil
return temp. > °C
with thermometer : 55

Test oil supply
temperature > °C : 42...47

Hold-up
revolutions >1/min : 1200
 Feedback
voltage mV : 2500

Actuator

Connections 5 and 6

Test temperature:

15°...30°C, ohms : 0,4...1,0
 50°...70°C, ohms : 0,45...1,1

Connections 5 and
ground, Mohms min. : 1,0
 Connections 6 and
ground, Mohms min. : 1,0
 Connections 3 and 5
Mohms min. : 1,0
 Connections 5 and 7
Mohms min. : 1,0

High-pressure compressor sensor
 Sensor coils
 Connections 3 and 2
 Ohms : 4,9...6,5
 Connections 1 and 2
 Ohms : 4,9...6,5
 Connections 1 and 3
 Ohms : 9,8...13,0

Connections 1 and
ground, Mohms min. : 1,0
 Connections 2 and
ground, Mohms min. : 1,0
 Connections 3 and
ground, Mohms min. : 1,0

Temperature sensor, fuel
 Conventions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1,2...4,0
 50°...70°C, kohms : 0,3...1,2

Connections 4 and
ground, Mohms min. : 1,0
 Connections 7 and
ground Mohms min. : 1,0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14,3...17,3
 50°...70°C, ohms : 15,5...21,0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2450

Setting value, bar : 7,8...8,2

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2450

Setting value, mm : 9,7...9,9

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2420

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 37,2...37,6

Dispersion cm³/ : 2,5

> 1000s :

Test specifications of injection pump

Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 200

Checkbk. volt

mV : 4000

Supply pump

pressure > bar : 9,9...10,5

> bar : (9,7...10,7)

2st speed 1/min : 300

Checkbk. volt

mV : 2450

Supply pump

pressure > bar : 6,7...7,9

> bar : (6,6...8,0)

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2450

Timing device

travel mm :
> mm : (8,8...10,8)

2nd speed 1/min : 2000

Checkbk. volt. mV : 4000

Timing device

travel mm : 11,8...12,6
> mm : (11,4...13,0)

3rd speed 1/min : 2100

Checkbk. volt. mV : 1310

Timing device

travel mm : max. 0,5
> mm : (max. 1,5)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 300

Checkbk. volt. mV : 2450

Timing device

travel mm : 6,9...9,3
> mm : (6,5...9,7)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2000

Checkbk. volt. mV : 4000

Measuring

temperature °C : 53

Overflow : 109...164

> cm³/10 : (96...178)

Fuel delivery variations:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt mV : 2500

Output

temperature °C : 51

Speed 1/min : 2000

Checkbk. volt mV : 4000

Meßtemperatur °C : 53

Fuel delivery cm³/ : 55,2...57,6

> 1000s : (54,6...58,2)

Dispersion cm³/ : 2,5

> 1000s. :

2nd temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 60
 Speed 1/min : 1000
 Checkbk. volt mV : 3210
 Measuring
 temperature °C : 56
 Fuel delivery cm³/ : 52,8...55,2
 > 1000s : (52,2...55,8)
 Dispersion cm³/ : 2,5
 > 1000s :

 3rd temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 60
 Speed 1/min : 1100
 Checkbk. volt mV : 2000
 Measuring
 temperature °C : 56
 Fuel delivery cm³/ : 24,0...26,0
 > 1000s : (23,5...26,5)
 Dispersion cm³/ : 2,5
 > 1000s :

 4th temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 750
 Checkbk. volt mV : 2420
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ :
 > 1000s : (36,1...38,7)
 Dispersion cm³/ : 2,5
 > 1000s :

 5th temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 500
 Checkbk. volt mV : 2450
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ : 43,8...46,4
 > 1000s : (43,3...46,9)
 Dispersion cm³/ : 3,0
 > 1000s :

Idle delivery:
 1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 400
 Checkbk. volt mV : 1550
 Meßtemperatur °C : 57
 Fuel delivery cm³/ : 8,2...12,2
 > 1000s : (7,2...13,2)
 Solenoid valve
 Start of
 injection, volts : 12
 Dispersion cm³/ : 4,0
 > 1000s :

 Starting fuel delivery:
 1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 65
 Speed 1/min : 100
 Checkbk. volt mV : 2310
 Measuring
 temperature °C : 61
 Fuel delivery cm³/ : 37,0...47,0
 > 1000s : (34,0...50,0)
 Solenoid valve
 Start of
 injection, volts : 12

 Stop test:
 Speed 1/min : 750
 Checkbk. volt mV : 3300
 ELAB volts : 0
 Fuel delivery cm³/ :
 max. 1000s : 3,0
 Start of

 Shutoff solenoid:
 Cut-in voltage
 min.> volts : 10,0
 Rated voltage,
 volts : 12,0

 Notes:
 High-pressure compressor sensor
 Testing only possible with ballast
 EPS 910

 Take note of test instructions
 "Distributor pump for direct
 injectors"!

 Dimensions for mounting and setting:

 Description
 K mm :
 KF mm : 6.2...6.6
 SVS max. mm :
 FH mm :
 TS : 1 467 010 410

BOSCH INJECTION PUMP TEST SPECIFICATIONS		ELECTRICAL TEST
Observe notes in remark column		Actuator
Test sheet	: PSA	Connections 5 and 6
Date of manufacture:		Test temperature: 15°...30°C, ohms : 0.4...1.0
Edition	: 26.10.1995	50°...70°C, ohms : 0.45...1.1
Replaces	:	Connections 5 and.
Test oil	: ISO 4113	ground, Mohms min. : 1.0
Injection pump	: VE4/10E2150R520	Connections 6 and
Type No.	: 0 460 404 993	ground, Mohms min. : 1.0
Customer Ident.No.:		Connections 2 and 6
Customer-specific details		Mohms min. : 1.0
Customer	: PSA	Connections 4 and 5
Engine	: DK5ATE	Mohms min. : 1.0
Output kW :		High-pressure compressor sensor
Speed 1/min :		Sensor coils
TEST BENCH PREREQUISITES		Connections 1 and 2
Inlet pressure, bar:	0.30...0.40	Ohms : 4.9...6.5
Calibrating nozzle-holder assembly > :	1 688 901 022	Connections 2 and 3
Opening pressure > bar :	130...133	Ohms : 4.9...6.5
Test pressure line :	1 680 750 073	Connections 1 and 3
Outer diameter :	6.00	Ohms : 9.8...13.0
x wall thickness > :	2.00	Connections 1 and.
x length > mm :	450	ground, Mohms min. : 1.0
Overflow valve	: 2 467 413 009	Connections 2 and
Test line	: 0 986 612 441	ground, Mohms min. : 1.0
(fuel-delivery actuator): (KDEP 1865/12)		Connections 3 and
Test line	: 0 986 612 435	ground, Mohms min. : 1.0
(solenoid valve start of injection): (KDEP 1865/6)		Temperature sensor, fuel
		Connections 4 and 7
		Test temperature: 15°...30°C, kohms : 1.2...4.0
		50°...70°C, kohms : 0.3...1.2
		Connections 4 and
		ground, Mohms min. : 1.0
		Connections 7 and
		ground Mohms min. : 1.0
		Solenoid valve, start of injection
		Connections 1 and 2
		Test temperature :
		15°...30°C, ohms : 14.3...17.3
		50°...70°C, ohms : 15.5...21.0
		Starting stop mV : 4120...4650
		Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 1000

Checkbk. volt.

mV : 2150

Setting value, bar : 9.4...10.4

Timing device travel:

Speed 1/min : 1000

Checkbk. volt

mV : 3020

Setting value, mm : 10.7...10.9

Speed 1/min : 1250

Checkbk. volt

mV : 2230

Fuel delivery cm³/
> 1000s : 32.4...32.8

Dispersion cm³/ : 2.0

> 1000s :

Test specifications of injection pump

Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2150

Checkbk. volt

mV : 3020

Supply pump
pressure > bar : 9.4...10.4

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 3020

Timing device

travel mm : 9.1...10.1
> mm : (8.4...10.8)

2nd speed 1/min : 1000

Checkbk. volt. mV : 3020

Timing device

travel mm :
> mm : (10.0...11.6)

3rd speed 1/min : 1600

Checkbk. volt. mV : 1600

Timing device

travel mm : 0.0...1.0
> mm : (0.0...2.5)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 2150

Checkbk. volt. mV : 3020

Timing device

travel mm : 12.0...12.6
> mm : (11.8...12.8)

Overflow at overflow valve:

Speed 1/min : 2400

Checkbk. volt. mV : 3020

Overflow : 96...178
> cm³/10s :

Fuel delivery variations:

Speed 1/min : 2150
Checkbk. volt mV : 3120
Fuel delivery cm³/ : 70.5...73.5
 > 1000s : (69.7...74.3)
Dispersion cm³/ : 2.0
 > 1000s. :

Speed 1/min : 1250
Checkbk. volt mV : 2230
Fuel delivery cm³/ :
 > 1000s : (31.3...33.9)
Dispersion cm³/ :
 > 1000s :

Speed 1/min : 1000
Checkbk. volt mV : 3275
Fuel delivery cm³/ : 90.5...93.5
 > 1000s : (89.5...94.5)
Dispersion cm³/ : 2.0
 > 1000s :

Idle delivery:

Speed 1/min : 375
Checkbk. volt mV : 2175
Fuel delivery cm³/ : 19.7...22.7
 > 1000s : (18.7...23.7)
Solenoid valve
Start of injection, volts : 12
Dispersion cm³/ : 2.0
 > 1000s :

Starting fuel delivery:
Speed 1/min : 100
Checkbk. volt mV : 3410
Fuel delivery cm³/ : 72.0...82.0
 > 1000s : (69.0...85.0)
Solenoid valve
Start of injection, volts : 12

Stop test:
Speed 1/min : 1000
Checkbk. volt mV : 3020
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Dispersion cm³/ : 5.0

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
 volts : 12.0

Dimensions for mounting and setting:

Description		
K	mm	: 3.6...3.8
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : Audi
 Date of manufacture:
 Edition : 25.10.1995
 Replaces:
 Test oil : ISO 4113

 Injection pump : VE5/11E2300L460-2

 Type No. : 0 460 415 989
 Customer Ident.No. :

 Customer-specific details
 Customer : VW

 Engine : R5 2.5 L TDi

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0,30...0,40

 Calibrating nozzle-holder assembly > : 1 688 901 114

 Opening pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 018

 Test line : 0 986 612 440
 (fuel-delivery actuator): (KDEP 1865/10)

Test line : 0 986 612 435
 Solenoid valve
 start of injection): (KDEP 1865/6)

TEST PRECONDITIONS

Test oil
 return temp. > °C
 with thermometer : 55

 Test oil supply
 temperature > °C : 42...47

Hold-up
 revolutions >1/min : 1200
 Feedback
 voltage mV : 2500

Actuator
 Connections 4 and 7
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 5 and.
 ground, Mohms min. : 1.0
 Connections 6 and
 ground, Mohms min. : 1.0
 Connections 3 and 5
 Mohms min. : 1.0
 Connections 5 and 7
 Mohms min. : 1.0

High-pressure compressor sensor
 Sensor coils
 Connections 2 and 3
 Ohms : 4.9...6.5
 Connections 1 and 3
 Ohms : 4.9...6.5
 Connections 1 and 2
 Ohms : 9.8...13.0

Connections 1 and.
 ground, Mohms min. : 1.0
 Connections 2 and
 ground, Mohms min. : 1.0
 Connections 3 and
 ground, Mohms min. : 1.0

Temperature sensor, fuel
 Connentions 5 and 6
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

Connections 5 and
 ground, Mohms min. : 1.0
 Connections 6 and
 ground Mohms min. : 1.0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 750

Checkbk. volt.

mV : 3900

Setting value, bar : 6.0...7.0

Timing device travel:

Speed 1/min : 750

Checkbk. volt

mV : 3900

Setting value, mm : 9.3...9.5

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2125

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2460

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 40.8...41.2

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2125

Checkbk. volt

mV : 3900

Supply pump pressure > bar : 7.9...8.9

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 3900

Timing device

travel mm : 7.5...9.9
> mm : (7.2...10.2)

2nd speed 1/min : 750

Checkbk. volt. mV : 3900

Timing device

travel mm :
> mm : (7.5...11.3)

3rd speed 1/min : 1200

Checkbk. volt. mV : 1800

Timing device

travel mm : max. 0.3
> mm : (max. 1.0)

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 2125

Checkbk. volt. mV : 3900

Timing device

travel mm : 11.6...12.6
> mm : (11.5...12.7)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2125

Checkbk. volt. mV : 3900

Measuring

temperature °C : 53

Overflow : 54...164

> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt mV : 3910
Meßtemperatur °C : 53
Fuel delivery cm³/ : 55.9...58.5
> 1000s : (55.2...59.2)
Dispersion cm³/ : 3.0
> 1000s :

2nd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3210
Measuring
temperature °C : 56
Fuel delivery cm³/ : 57.2...59.8
> 1000s : (56.5...60.5)
Dispersion cm³/ : 2.0
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2460
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (39.7...42.3)
Dispersion cm³/ :
> 1000s :

4th temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2320
Measuring
temperature °C : 57
Fuel delivery cm³/ : 42.1...44.7
> 1000s : (41.4...45.4)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1520
Meßtemperatur °C : 57
Fuel delivery cm³/ : 10.2...13.5
> 1000s : (9.2...15.2)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2960
Measuring
temperature °C : 61
Fuel delivery cm³/ : 77.5...89.5
> 1000s : (72.5...84.5)
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 1500
Checkbk. volt mV : 4125
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of
injection, volts : 12
Speed 1/min : 750
Checkbk. volt mV : 2460
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 5.0

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:	2.7...2.9
KF	mm	:	6.5...6.9
SVS max.	mm	:	
FH	mm	:	
TS		:	1 467 010 494

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : Volvo
 Date of manufacture:
 Edition : 25.10.1995
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE5/11E2300L649

 Type No. : 0 460 415 990
 Customer Ident.No. :

 Customer-specific details
 Customer : Audi

 Engine : 2.5 TDI USA

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

 Inlet pressure, bar: 0.30...0.40

 Calibrating nozzle-
 holder assembly > : 1 688 901 114

 Opening
 pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 018

 Test line : 0 986 612 439
 (fuel-delivery actuator): (KDEP 1865/10)

 Test line : 0 986 611 983
 (solenoid valve
 start of injection): (KDEP 1190)

TEST PRECONDITIONS

 Test oil
 return temp. > °C
 with thermometer : 55

 Test oil supply
 temperature > °C : 42...47

 Hold-up
 revolutions >1/min : 1200
 Feedback
 voltage mV : 2500

Actuator
 Connections 5 and 6
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.5...1.1

 Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground, Mohms min. : 1.0
 Connections 3 and 5 Mohms min. : 1.0
 Connections 6 and 7 Mohms min. : 1.0

 High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2 Ohms : 4.9...6.5
 Connections 2 and 3 Ohms : 4.9...6.5
 Connections 1 and 3 Ohms : 9.8...13.0

 Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

 Temperature sensor, fuel
 Conventions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1,2

 Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0

 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

 Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 750

Checkbk. volt.

mV : 3900

Setting value, bar : 6.0...7.0

Timing device travel:

Speed 1/min : 750

Checkbk. volt

mV : 3900

Setting value, mm : 9.3...9.5

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2125

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2460

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 40.8...41.2

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2125

Checkbk. volt

mV : 3900

Supply pump

pressure > bar : 7.9...8.9

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 3900

Timing device

travel mm : 7.5...9.9
> mm : (7.2...10.2)

2nd speed 1/min : 750

Checkbk. volt. mV : 3900

Timing device

travel mm :
> mm : (7.5...11.3)

3rd speed 1/min : 1200

Checkbk. volt. mV : 1800

Timing device

travel mm : max. 0.3
> mm : (max. 1.0)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 2125

Checkbk. volt. mV : 3900

Timing device

travel mm : 11.6...12.6
> mm : (11.5...12.7)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2125

Checkbk. volt. mV : 3900

Measuring

temperature °C : 53

Overflow : 60...170

> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt mV : 3910
Meßtemperatur °C : 53
Fuel delivery cm³/ : 55.7...58.3
> 1000s : (55.0...59.0)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3210
Measuring
temperature °C : 56
Fuel delivery cm³/ : 58.0...60.6
> 1000s : (57.3...61.3)
Dispersion cm³/ : 2.0
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2460
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (39.7...42.3)
Dispersion cm³/ :
> 1000s :

4th temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2320
Measuring
temperature °C : 57
Fuel delivery cm³/ : 41.1...44.0
> 1000s : (40.7...44.7)
Dispersion cm³/ : 3,0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1520
Meßtemperatur °C : 57
Fuel delivery cm³/ : 9.0...13.0
> 1000s : (8.0...14.0)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2960
Measuring
temperature °C : 61
Fuel delivery cm³/ : 79.0...91.0
> 1000s : (74.0...96.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 1500
Checkbk. volt mV : 4125
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Start of
Solenoid valve
Start of
injection, volts : 12

Speed 1/min : 750
Checkbk. volt mV : 2460
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 5.0

Start of

Shutoff solenoid:

Cut-in voltage
min.> volts : 10,0
Rated voltage,
volts : 12,0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:	2.7...2.9
KF	mm	:	6.5...6.9
SVS max.	mm	:	
FH	mm	:	
TS		:	1 467 010 494

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : MB
 Date of manufacture:
 Edition : 05.12.1995
 Replaces:
 Test oil : ISO 4113

 Injection pump : VE5/11E1900R641

 Type No. : 0 460 415 992
 Customer Ident.No. :

 Customer-specific details
 Customer : Mercedes-Benz

 Engine : T1N-2-Fh

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

 Inlet pressure, bar : 0.30...0.40

 Calibrating nozzle-holder assembly > : 1 688 901 116

 Opening pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 018

 Test line (fuel-delivery actuator) : 0 986 612 698

 Test line (solenoid valve start of injection) : (1 687 011 208)

TEST PRECONDITIONS

 Test oil return temp. > °C with thermometer : 55

 Test oil supply temperature > °C : 42...47

 Hold-up revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator
 Connections 12 and 13
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

 Connections 13 and ground, Mohms min. : 1.0
 Connections 12 and ground, Mohms min. : 1.0
 Connections 8 and 13 Mohms min. : 1.0
 Connections 12 and 1 Mohms min. : 1.0

 High-pressure compressor sensor
 Sensor coils
 Connections 8 and 7 Ohms : 4.9...6.5
 Connections 6 and 7 Ohms : 4.9...6.5
 Connections 6 and 8 Ohms : 9.8...13.0

 Connections 6 and ground, Mohms min. : 1.0
 Connections 7 and ground, Mohms min. : 1.0
 Connections 8 and ground, Mohms min. : 1.0

 Temperature sensor, fuel
 Connections 1 and 2
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

 Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground Mohms min. : 1.0

 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

 Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2620

Setting value, bar : 9.3...9.5

: (9.1...9.7)

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2620

Setting value, mm : 11.9...12.7

: (11.0...13.6)

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2520

Measuring

temperature °C : 57

Fuel delivery cm³/ : 51.3...51.7

> 1000s : (49.5...53.5)

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 1900

Checkbk. volt

mV : 3570

Supply pump

pressure > bar : 11.3...11.9

> bar : (11.1...12.1)

2st speed 1/min : 200

Checkbk. volt

mV : 2620

Supply pump

pressure > bar : 4.6...6.6

> bar : (4.4...6.8)

Timing device variations:

1st speed 1/min : 1900

Checkbk. volt. mV : 3570

Timing device

travel mm : 11.8...12.8
> mm : (11.5...13.1)

2nd speed 1/min : 200

Checkbk. volt. mV : 2620

Timing device

travel mm : 3.0...6.0
> mm : (1.3...7.7)

3rd speed 1/min : 1900

Checkbk. volt. mV : 1500

Timing device

travel mm : 0...3.5
> mm :

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 1100

Checkbk. volt. mV : 1530

Timing device

travel mm : 0...0.6
> mm : (0...0.8)

Solenoid valve

Start of
injection, volts : 12

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 1900

Checkbk. volt. mV : 3570

Measuring

temperature °C : 53

Overflow : 137...192

> cm³/10s : (123...206)

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 1900
Checkbk. volt mV : 3570
Meßtemperatur °C : 53
Fuel delivery cm³/ : 68.1...70.5
> 1000s : (66.6...72.0)
Dispersion cm³/ : 2.5
> 1000s :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3080
Measuring
temperature °C : 56
Fuel delivery cm³/ : 69.3...71.9
> 1000s : (68.6...72.6)
Dispersion cm³/ : 4.0
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2620
Measuring
temperature °C : 57
Fuel delivery cm³/ : 62.7...65.3
> 1000s : (62.0...66.0)
Dispersion cm³/ :
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 340
Checkbk. volt mV : 2000
Meßtemperatur °C : 57
Fuel delivery cm³/ : 13.5...17.5
> 1000s : (12.5...18.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 3110
Measuring
temperature °C : 61
Fuel delivery cm³/ : 75.6
> 1000s :

Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 1000
Checkbk. volt mV : 4000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Start of

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	: 3.2...3.4
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

BOSCH INJECTION PUMP TEST SPECIFICATIONS		ELECTRICAL TEST
Observe notes in remark column		
Test sheet	: VW	Actuator
Date of manufacture		Connections 5 and 6
Edition	: 22.10.1996	Test temperature:
Replaces		15°...30°C, ohms : 0.4...1.0
Test oil	: ISO 4113	50°...70°C, ohms : 0.45...1.1
Injection pump	: VE4/10E2100R701	Connections 5 and ground, Mohms min. : 1.0
Type No.	: 0 460 404 976	Connections 6 and ground, Mohms min. : 1.0
Customer Ident.No.		Connections 3 and 5 Mohms min. : 1.0
Customer-specific details		Connections 6 and 7 Mohms min. : 1.0
Customer	: VW	High-pressure compressor sensor
Engine	: 1.7 SDI EDC	Sensor coils
Output kW	:	Connections 1 and 2
Speed 1/min	:	Ohms : 4.9...6.5
TEST BENCH PREREQUISITES		Connections 2 and 3
Inlet pressure, bar	: 0.30...0.40	Ohms : 4.9...6.5
Calibrating nozzle-holder assembly >	: 1 688 901 114	Connections 1 and 3
Opening pressure >	bar : 207...210	Ohms : 9.8...13.0
Test pressure line	: 1 680 750 085	Connections 1 and ground, Mohms min. : 1.0
Outer diameter	: 6.00	Connections 2 and ground, Mohms min. : 1.0
x wall thickness >	: 2.20	Connections 3 and ground, Mohms min. : 1.0
x length > mm	: 350	Temperature sensor, fuel Connentions 4 and 7
Overflow valve	: 2 467 413 018	Test temperature: 15°...30°C, kohms : 1.2...4.0 50°...70°C, kohms : 0.3...1.2
Test line	: 0 986 612 444	Connections 4 and ground, Mohms min. : 1.0
(fuel-delivery actuator)		Connections 7 and ground Mohms min. : 1.0
Test line	: 1 687 011 208	Solenoid valve, start of injection
(solenoid valve start of injection): (Test cable set)		Connections 1 and 2
TEST PRECONDITIONS		Test temperature : 15°...30°C, ohms : 14.3...17.3 50°...70°C, ohms : 15.5...21.0
Test oil return temp. > °C		Starting stop mV : 4120...4650
with thermometer	: 55	Shutoff stop mV : 650...850
Test oil supply temperature > °C	: 42...47	
Hold-up revolutions >1/min	: 1200	
Feedback voltage mV	: 2500	

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2510
Setting value, bar : 7.8...8.6

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2510
Setting value, mm : 9.6...9.8

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt
mV : 2650
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 34.8...35.2
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100
Checkbk. volt
mV : 3330
Supply pump
pressure > bar : 10.4...11.4
> bar :

2st speed 1/min : 300
Checkbk. volt
mV : 2510
Supply pump
pressure > bar : 6.8...8.2
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2510
Timing device
travel mm :
> mm : (8.7...10.7)

2nd speed 1/min : 2100
Checkbk. volt. mV : 3330
Timing device
travel mm : 11.8...12.8
> mm : (11.5...13.1)

3rd speed 1/min : 2100
Checkbk. volt. mV : 1440
Timing device
travel mm : max. 3.0
> mm :
Solenoid valve
Start of
injection, volts : 12
4.th speed 1/min : 300
Checkbk. volt. mV : 2510
Timing device
travel mm : 6.5...10.5
> mm : (5.1...11.9)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt. mV : 3330
Measuring
temperature °C : 53
Overflow : 116...200
> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt mV : 3330
Meßtemperatur °C : 53
Fuel delivery cm³/ : 36.3...38.7
> 1000s : (35.7...39.3)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning

revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 1100
Checkbk. volt mV : 2880
Measuring
temperature °C : 53
Fuel delivery cm³/ : 34.9...37.3
> 1000s : (34.3...37.9)
Dispersion cm³/ :
> 1000s. :

3rd temperature-conditioning

revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 1100
Checkbk. volt mV : 2420
Measuring
temperature °C : 53
Fuel delivery cm³/ : 25.4...27.8
> 1000s : (25.1...28.1)
Dispersion cm³/ :
> 1000s. :

4th temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt mV : 2650
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.7...36.3)
Dispersion cm³/ :
> 1000s : (2.5)

5th temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2510
Measuring
temperature °C : 57
Fuel delivery cm³/ : 35.5...38.1
> 1000s : (34.8...38.8)
Dispersion cm³/ : 3.0
> 1000s. :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1820
Meßtemperatur °C : 57
Fuel delivery cm³/ : 5.6...9.6
> 1000s : (4.6...10.6)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2820
Measuring
temperature °C : 61
Fuel delivery cm³/ : 43.0...53.0
> 1000s : (40.0...56.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 1000
Checkbk. volt mV : 3330
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Start of

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : Audi
 Date of manufacture :
 Edition : 17.03.1997
 Replaces :
 Test oil : ISO 4113
 Injection pump : VE4/10E2250R530-1
 Type No. : 0 460 404 983
 Customer Ident.No. :

Customer-specific details
 Customer : Audi

Engine : 1.9 TDI EDC
 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40
 Calibrating nozzle-holder assembly > : 1 688 901 114
 Opening pressure > bar : 207...210
 Test pressure line : 1 680 750 085
 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350
 Overflow valve : 2 467 413 018
 Test line (fuel-delivery actuator) : 0 986 612 440
 Test line Solenoid valve start of injection) : (KDEP 1865/10)
 Test line : 0 986 611 983

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer : 55
 Test oil supply temperature > °C : 42...47
 Hold-up revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator
 Connections 4 and 7
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1
 Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground, Mohms min. : 1.0
 Connections 3 and 4 Mohms min. : 1.0
 Connections 6 and 7 Mohms min. : 1.0
 High-pressure compressor sensor
 Sensor coils
 Connections 1 and 3 Ohms : 4.9...6.5
 Connections 2 and 3 Ohms : 4.9...6.5
 Connections 1 and 2 Ohms : 9.8...13.0
 Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0
 Temperature sensor, fuel
 Conventions 5 and 6
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2
 Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground Mohms min. : 1.0
 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0
 Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2245

Setting value, bar : 6.0...7.4

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2245

Setting value, mm : 10.8...11.0

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2480

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 38.8...39.2

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000

Checkbk. volt

mV : 3890

Supply pump

pressure > bar : 8.4...9.8
> bar : (8.3...9.9)

2nd speed 1/min : 150

Checkbk. volt

mV : 2230

Supply pump

pressure > bar : min. 3.5
> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2245

Timing device

travel mm :
> mm : (9.9...11.9)

2nd speed 1/min : 2000

Checkbk. volt. mV : 3890

Timing device

travel mm : 11.5...12.9
> mm : (11.4...13.0)

3rd speed 1/min : 1400

Checkbk. volt. mV : 1475

Timing device

travel mm : max. 0.5
> mm : (max. 0.8)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 300

Checkbk. volt. mV : 2245

Timing device

travel mm : 8.9...12.1
> mm : (8.5...12.5)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2000

Checkbk. volt. mV : 3890

Measuring

temperature °C : 53

Overflow : 83...167
> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3890
Meßtemperatur °C : 53
Fuel delivery cm³/ : 48.2...51.2
> 1000s : (47.9...51.5)
Dispersion cm³/ : 2.5
> 1000s. : (2.5)

2nd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.7...40.3)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2245
Measuring
temperature °C : 57
Fuel delivery cm³/ : 36.7...39.7
> 1000s : (35.9...40.5)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1600
Meßtemperatur °C : 57
Fuel delivery cm³/ : 11.2...16.8
> 1000s : (11.0...17.0)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2230
Measuring
temperature °C : 61
Fuel delivery cm³/ : 32.4...44.4
> 1000s : (30.4...46.4)

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 750
Checkbk. volt mV : 2480
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	: 6.2...6.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : Chrysler
 Date of manufacture :
 Edition : 24.01.1997
 Replaces :
 Test oil : ISO 4113

Injection pump : VE4/10E2100L694-1

Type No. : 0 460 404 963
 Customer Ident.No. :Customer-specific details
 Customer : Chrysler

Engine : 425 CLIEE

Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-
 holder assembly > : 1 688 901 022Opening
 pressure > bar : 130...133

Test pressure line : 1 680 750 073

Outer diameter : 6.00
 x wall thickness > : 2.00
 x length > mm : 450

Overflow valve : 2 467 413 018

Test line : 0 986 612 445
 (fuel-delivery actuator)Test line : 1 687 011 208
 (solenoid valve start
 of injection) : (Test cable set)

Actuator

Connections 8 and 9

Test temperature:

15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1Connections 8 and.
 ground, Mohms min. : 1.0
 Connections 9 and
 ground, Mohms min. : 1.0
 Connections 2 and 8
 Mohms min. : 1.0
 Connections 7 and 9
 Mohms min. : 1.0High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2
 kohms : 4.9...6.5
 Connections 3 and 2
 kohms : 4.9...6.5
 Connections 1 and 3
 kohms : 9.8...13.0Connections 1 and.
 ground, Mohms min. : 1.0
 Connections 2 and
 ground, Mohms min. : 1.0
 Connections 3 and
 ground, Mohms min. : 1.0Temperature sensor, fuel
 Connentions 4 and 7

Test temperature:

15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2Connections 4 and
 ground, Mohms min. : 1.0
 Connections 7 and
 ground Mohms min. : 1.0Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 1000

Checkbk. volt.

mV : 3100

Setting value, bar : 6.4...7.8

Timing device travel:

Speed 1/min : 1000

Checkbk. volt

mV : 3100

Setting value, mm : 6.9...7.1

Full-load delivery :

Speed 1/min : 1250

Checkbk. volt

mV : 2270

Fuel delivery cm³/

> 1000s : 30.6...31.0

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump

Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100

Checkbk. volt

mV : 3100

Supply pump

pressure > bar : 8.0...9.4

> bar :

2st speed 1/min : 500

Checkbk. volt

mV : 3100

Supply pump

pressure > bar : 6.0...7.4

> bar :

3st speed 1/min : 150

Checkbk. volt

mV : 3680

Supply pump

pressure > bar : min. 3.5

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 3100

Timing device

travel mm : 6.9...7.1

> mm : (5.0...7.0)

2nd speed 1/min : 1000

Checkbk. volt. mV : 3100

Timing device

travel mm :

> mm : (6.1...7.9)

3rd speed 1/min : 1500

Checkbk. volt. mV : 1680

Timing device

travel mm : 0.0...0.5

> mm : (0.0...1.5)

Solenoid valve

Start of

injection, volts : 12

Overflow at overflow valve:

Speed 1/min : 2100

Checkbk. volt. mV : 3100

Overflow : 56...167

> cm³/10s :

Fuel delivery variations:

1. Speed 1/min : 2100
Checkbk. volt mV : 3100
Fuel delivery cm³/ : 63.5...66.5
> 1000s : (63.0...67.0)
Dispersion cm³/ :
> 1000s. :

2. Speed 1/min : 1250
Checkbk. volt mV : 2270
Fuel delivery cm³/ :
> 1000s : (29.5...32.1)
Dispersion cm³/ :
> 1000s : (3.0)

3. Speed 1/min : 1000
Checkbk. volt mV : 3100
Fuel delivery cm³/ : 67.7...69.7
> 1000s : (66.2...70.2)
Dispersion cm³/ : 2.0
> 1000s :

4. Speed 1/min : 500
Checkbk. volt mV : 2660
Fuel delivery cm³/ : 43.4...46.4
> 1000s : (42.9...46.9)
Dispersion cm³/ : 2.0
> 1000s :

Idle delivery:

Speed 1/min : 400
Checkbk. volt mV : 2000
Fuel delivery cm³/ : 12.1...15.5
> 1000s : (11.5...16.1)

Solenoid valve

Start of injection, volts : 12
Dispersion cm³/ : 2.0
> 1000s : (3.0)

Starting fuel delivery:

Speed 1/min : 100
Checkbk. volt mV : 3680
Fuel delivery cm³/ :
> 1000s : 72.0...82.0

Solenoid valve

Start of injection, volts : 12

Stop test:

Speed 1/min. : 2100
Checkbk. volt mV : 3100
ELAB volts : 0
Fuel delivery cm³/ : 3.0
max. 1000s :

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture:
 Edition : 14.02.1997
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE4/10E2250R640-3

 Type No. : 0 460 404 964
 Customer Ident.No. :

 Customer-specific details
 Customer : VW

 Engine : 1.9 SDI EDC

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

 Inlet pressure, bar : 0.30...0.40

 Calibrating nozzle-holder assembly > : 1 688 901 114

 Opening pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 018

 Test line (fuel-delivery actuator) : 0 986 612 439

 Test line (solenoid valve start of injection) : (KDEP 1865/10)

TEST PRECONDITIONS

 Test oil return temp. > °C with thermometer : 55

 Test oil supply temperature > °C : 42...47

 Hold-up revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator
 Connections 5 and 6
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

 Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground, Mohms min. : 1.0
 Connections 3 and 5 Mohms min. : 1.0
 Connections 6 and 7 Mohms min. : 1.0

 High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2 Ohms : 4.9...6.5
 Connections 2 and 3 Ohms : 4.9...6.5
 Connections 1 and 3 Ohms : 9.8...13.0

 Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

 Temperature sensor, fuel
 Connections 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

 Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0

 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

 Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2360

Setting value, bar : 5.6...7.0

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2360

Setting value, mm : 10.6...10.8

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 800

Checkbk. volt

mV : 2550

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 34.6...35.0

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump

Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100

Checkbk. volt

mV : 3370

Supply pump

pressure > bar : 8.3...9.7

> bar : (8.2...9.8)

2st speed 1/min : 300

Checkbk. volt

mV : 2360

Supply pump

pressure > bar : 5.2...6.8

> bar : (5.1...6.9)

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2360

Timing device

travel mm :

> mm : (9.7...11.7)

2nd speed 1/min : 2100

Checkbk. volt. mV : 3370

Timing device

travel mm : 11.5...12.9

> mm : (11.4...13.0)

3rd speed 1/min : 2100

Checkbk. volt. mV : 1400

Timing device

travel mm : max. 3.2

> mm : (max. 4.0)

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 300

Checkbk. volt. mV : 2360

Timing device

travel mm : 8.4...11.2

> mm : (8.2...11.4)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2100

Checkbk. volt. mV : 3370

Measuring

temperature °C : 53

Overflow : 109...164

> cm³/10s : (82...192)

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt mV : 3370
Meßtemperatur °C : 53
Fuel delivery cm³/ : 36.2...38.2
> 1000s : (35.9...39.5)
Dispersion cm³/ : 2.5
> 1000s. : (2.5)

2nd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt mV : 2550
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.5...36.1)
Dispersion cm³/ :
> 1000s : (3.0)

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2360
Measuring
temperature °C : 57
Fuel delivery cm³/ : 35.6...38.6
> 1000s : (35.3...38.9)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1640
Meßtemperatur °C : 57
Fuel delivery cm³/ : 6.0...11.0
> 1000s : (5.5...11.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2730
Measuring
temperature °C : 61
Fuel delivery cm³/ : 42.0...54.0
> 1000s : (40.0...56.0)

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 750
Checkbk. volt mV : 3650
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of
Shutoff solenoid:
Cut-in voltage
min. > volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	: 6.2...6.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : Nissan
 Date of manufacture:
 Edition : 24.03.1997
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE4/10E2200L736

 Type No. : 0 460 404 965
 Customer Ident. No. :

 Customer-specific details
 Customer : Nissan

 Engine : CD 20 T

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

 Inlet pressure, bar : 0.30...0.40

 Calibrating nozzle-holder assembly > : 1 688 901 022

 Opening pressure > bar : 130...133

 Test pressure line : 1 680 750 073

 Outer diameter : 6.00
 x wall thickness > : 2.00
 x length > mm : 450

 Overflow valve :

 Overflow valve :

 Test line : 0 986 612 442
 (fuel-delivery actuator)

 Test line : 1 687 011 208
 (solenoid valve
 start of injection): (Test cable set)

Actuator

Connections 4 and 7

Test temperature:

15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground, Mohms min. : 1.0
 Connections 2 and 7 Mohms min. : 1.0
 Connections 4 and 6 Mohms min. : 1.0

High-pressure compressor sensor
 Sensor coils
 Connections 1 and 3 kohms : 4.9...6.5
 Connections 2 and 3 kohms : 4.9...6.5
 Connections 1 and 2 kohms : 9.8...13.0

Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
 Conventions 5 and 6
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground Mohms min. : 1.0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 1050

Checkbk. volt.

mV : 2860

Setting value, bar : 8.5...8.7

Timing device travel:

Speed 1/min : 1050

Checkbk. volt

mV : 2860

Setting value, mm : 11.6...12.6

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 1500

Checkbk. volt

mV : 2250

Fuel delivery cm³/

> 1000s : 23.2...23.6

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump

Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000

Checkbk. volt

mV : 2915

Supply pump

pressure > bar : 9.6...10.6
> bar : (9.4...10.8)

2st speed 1/min : 1050

Checkbk. volt

mV : 2860

Supply pump

pressure > bar :
> bar : (7.9...9.3)

3st speed 1/min : 600

Checkbk. volt

mV : 2610

Supply pump

pressure > bar : 7.5...8.5
> bar : (7.3...8.7)

4st speed 1/min : 200

Checkbk. volt

mV : 2570

Supply pump

pressure > bar : 5.2...6.8
> bar : (4.9...7.1)

Timing device variations:

1st speed 1/min : 600

Checkbk. volt. mV : 2580

Timing device

travel mm : 10.6...12.6
> mm : (9.1...14.1)

2nd speed 1/min : 1050

Checkbk. volt. mV : 2860

Timing device

travel mm :
> mm : (11.3...12.9)

3rd speed 1/min : 1050

Checkbk. volt. mV : 1850

Timing device

travel mm : max. 0.4
> mm : (max. 0.6)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 1500

Checkbk. volt. mV : 2960

Timing device

travel mm : 12.0...12.6
> mm : (11.3...13.3)

5.th speed 1/min : 2000

Checkbk. volt. mV : 2915

Timing device

travel mm : 11.9...12.7
> mm : (11.5...13.1)

6.th speed 1/min : 2200

Checkbk. volt. mV : 1620

Timing device

travel mm : max. 1.5
> mm : (max. 2.0)

Solenoid valve

Start of
injection, volts : 12

7.th speed 1/min : 600

Checkbk. volt. mV : 2580

Timing device

travel mm : 10.6...12.6
> mm : (9.1...13.1)

Overflow at overflow valve:

Speed 1/min : 2200

Checkbk. volt. mV : 2910

Overflow : 125...208
> cm³/10s :

Fuel delivery variations:

1. Speed 1/min : 2000
Checkbk. volt mV : 2915
Fuel delivery cm³/ : 51.0...54.4
> 1000s : (50.2...55.2)
Dispersion cm³/ : 2.5
> 1000s. :

2. Speed 1/min : 1600
Checkbk. volt mV : 2580
Fuel delivery cm³/ : 37.2...39.6
> 1000s : (36.4...40.4)
Dispersion cm³/ : 2.0
> 1000s :

3. Speed 1/min : 1200
Checkbk. volt mV : 2980
Fuel delivery cm³/ : 54.5...57.3
> 1000s : (53.4...58.3)
Dispersion cm³/ : 2.0
> 1000s :

4. Speed 1/min : 1200
Checkbk. volt mV : 2250
Fuel delivery cm³/ :
> 1000s : (21.6...25.2)
Dispersion cm³/ :
> 1000s : (3.0)

5. Speed 1/min : 600
Checkbk. volt mV : 2610
Fuel delivery cm³/ : 34.6...38.0
> 1000s : (33.8...40.8)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:

Speed 1/min : 400
Checkbk. volt mV : 2190
Fuel delivery cm³/ : 10.4...14.4
> 1000s : (9.4...15.4)

Solenoid valve

Start of
injection, volts : 12
Dispersion cm³/ : 2.0
> 1000s : (3.0)

Starting fuel delivery:

Speed 1/min : 100
Checkbk. volt mV : 3550
Fuel delivery cm³/ : 53.9...65.9
> 1000s : (50.9...68.9)

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 1500
Checkbk. volt mV : 4000
ELAB volts : 0
Fuel delivery cm³/ : 2.5
max. 1000s :

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	:
SVS max.	mm	:
FH	ram	:

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture :
 Edition : 08.10.1996
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE4/10E2250R728

 Type No. : 0 460 404 966
 Customer Ident.No. :

 Customer-specific details
 Customer : VW

 Engine : 1.9 SDI EDC

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

 Inlet pressure, bar: 0.30...0.40

 Calibrating nozzle-holder assembly > : 1 688 901 114

 Opening pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 018

 Test line : 0 986 612 444
 (fuel-delivery actuator)

 Test line : 1 687 011 208
 (solenoid valve
 start of injection): (Test cable set)

TEST PRECONDITIONS

 Test oil
 return temp. > °C
 with thermometer : 55

 Test oil supply
 temperature > °C : 42...47

 Hold-up
 revolutions >1/min : 1200
 Feedback
 voltage mV : 2500

Actuator
 Connections 5 and 6
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

 Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground, Mohms min. : 1.0
 Connections 3 and 5 Mohms min. : 1.0
 Connections 6 and 7 Mohms min. : 1.0

 High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2 Ohms : 4.9...6.5
 Connections 2 and 3 Ohms : 4.9...6.5
 Connections 1 and 3 Ohms : 9.8...13.0

 Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

 Temperature sensor, fuel
 Connentions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

 Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0

 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

 Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2360

Setting value, bar : 5.9...6.7

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2360

Setting value, mm : 10.6...10.8

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 800

Checkbk. volt

mV : 2550

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 34.6...35.0

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100

Checkbk. volt

mV : 3370

Supply pump

pressure > bar : 8.4...9.6
> bar : (8.2...9.8)

2st speed 1/min : 300

Checkbk. volt

mV : 2360

Supply pump

pressure > bar : 5.3...6.7
> bar : (5.1...6.9)

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2360

Timing device

travel mm :
> mm : (9.7...11.7)

2nd speed 1/min : 2100

Checkbk. volt. mV : 3370

Timing device

travel mm : 11.8...12.6
> mm : (11.4...13.0)

3rd speed 1/min : 2100

Checkbk. volt. mV : 1400

Timing device

travel mm : max. 3.2
> mm : (max. 4.0)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 300

Checkbk. volt. mV : 2360

Timing device

travel mm : 8.6...11.0
> mm : (8.2...11.4)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2100

Checkbk. volt. mV : 3370

Measuring

temperature °C : 53

Overflow : 111...167
> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt mV : 3370
Meßtemperatur °C : 53
Fuel delivery cm³/ : 36.5...38.9
> 1000s : (35.9...39.5)
Dispersion cm³/ : 2.5
> 1000s. : (2.5)

2nd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt mV : 2550
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.5...36.1)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2360
Measuring
temperature °C : 57
Fuel delivery cm³/ : 35.6...38.6
> 1000s : (35.3...38.9)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1640
Meßtemperatur °C : 57
Fuel delivery cm³/ : 6.5...10.5
> 1000s : (5.5...11.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2730
Measuring
temperature °C : 61
Fuel delivery cm³/ : 43.0...53.0
> 1000s : (40.0...56.0)

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 750
Checkbk. volt mV : 3650
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Start of

Shutoff solenoid:

Cut-in voltage
min. > volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	: 6.2...6.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture :
 Edition : 22.10.1996
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE4/10E2100R701-3

 Type No. : 0 460 404 967
 Customer Ident.No. :

 Customer-specific details
 Customer : VW

 Engine : 1.7 SDI EDC

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

 Inlet pressure, bar : 0.30...0.40

 Calibrating nozzle-holder assembly > : 1 688 901 114

 Opening pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 018

 Test line : 0 986 612 444
 (fuel-delivery actuator)

 Test line : 1 687 011 208
 (solenoid valve
 start of injection): (Test cable set)

TEST PRECONDITIONS

Test oil
 return temp. > °C
 with thermometer : 55

 Test oil supply
 temperature > °C : 42...47

 Hold-up
 revolutions >1/min : 1200
 Feedback
 voltage mV : 2500

Actuator
 Connections 5 and 6
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

 Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground, Mohms min. : 1.0
 Connections 3 and 5 Mohms min. : 1.0
 Connections 6 and 7 Mohms min. : 1.0

 High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2
 Ohms : 4.9...6.5
 Connections 2 and 3
 Ohms : 4.9...6.5
 Connections 1 and 3
 Ohms : 9.8...13.0

 Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

 Temperature sensor, fuel
 Connentions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

 Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0

 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

 Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2510

Setting value, bar : 7.8...8.6

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2510

Setting value, mm : 9.6...9.8

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 800

Checkbk. volt

mV : 2650

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 34.8...35.2

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump

Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100

Checkbk. volt

mV : 3330

Supply pump

pressure > bar : 10.4...11.4

> bar :

2st speed 1/min : 300

Checkbk. volt

mV : 2510

Supply pump

pressure > bar : 6.8...8.2

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2510

Timing device

travel mm :
> mm : (8.7...10.7)

2nd speed 1/min : 2100

Checkbk. volt. mV : 3330

Timing device

travel mm : 11.8...12.8
> mm : (11.5...13.1)

3rd speed 1/min : 2100

Checkbk. volt. mV : 1440

Timing device

travel mm : max. 3.0
> mm :

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 300

Checkbk. volt. mV : 2510

Timing device

travel mm : 6.5...10.5
> mm : (5.1...11.9)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2100

Output

temperature °C : 51

Speed 1/min : 2100

Checkbk. volt. mV : 3300

Measuring

temperature °C : 53

Overflow : 116...200

> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt mV : 3330
Meßtemperatur °C : 53
Fuel delivery cm³/ : 36.3...38.7
> 1000s : (35.7...39.3)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning

revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 1100
Checkbk. volt mV : 2880
Measuring
temperature °C : 53
Fuel delivery cm³/ : 34.9...37.3
> 1000s : (34.3...37.9)
Dispersion cm³/ :
> 1000s :

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt mV : 2650
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.7...36.3)
Dispersion cm³/ :
> 1000s : (2.5)

4th temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2510
Measuring
temperature °C : 57
Fuel delivery cm³/ : 35.5...38.1
> 1000s : (34.8...38.8)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1820
Meßtemperatur °C : 57
Fuel delivery cm³/ : 5.6...9.6
> 1000s : (4.6...10.6)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2820
Measuring
temperature °C : 61
Fuel delivery cm³/ : 43.0...53.0
> 1000s : (40.0...56.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 1000
Checkbk. volt mV : 3330
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:

Cut-in voltage
min. > volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture:
 Edition : 11.10.1996
 Replaces:
 Test oil : ISO 4113

 Injection pump : VE4/10E2075R696-3

 Type No. : 0 460 404 968
 Customer Ident.No. :

Customer-specific details
 Customer : VW

Engine : 1.9 TDI EDC

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar: 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 114

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 444
(fuel-delivery actuator)Test line : 1 687 011 208
(solenoid valve
start of injection): (Test cable set)

TEST PRECONDITIONS

Test oil
 return temp. > °C
 with thermometer : 55

 Test oil supply
 temperature > °C : 42...47

Hold-up
 revolutions >1/min : 1200
 Feedback
 voltage mV : 2500

Actuator

Connections 5 and 6

Test temperature:

15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground, Mohms min. : 1.0
 Connections 3 and 5 Mohms min. : 1.0
 Connections 6 and 7 Mohms min. : 1.0

High-pressure compressor sensor

Sensor coils

Connections 1 and 2 Ohms : 4.9...6.5
 Connections 2 and 3 Ohms : 4.9...6.5
 Connections 1 and 3 Ohms : 9.8...13.0

Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
 Connentions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2560

Setting value, bar : 8.4...9.2

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2510

Setting value, mm : 10.1...10.3

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2480

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 34.7...35.1

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump

Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100

Checkbk. volt

mV : 3890

Supply pump

pressure > bar : 10.9...11.9

> bar :

2st speed 1/min : 300

Checkbk. volt

mV : 2560

Supply pump

pressure > bar : 6.6...8.0

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2510

Timing device

travel mm :
> mm : (9.2...11.2)

2nd speed 1/min : 2050

Checkbk. volt. mV : 3330

Timing device

travel mm : 11.8...12.8
> mm : (11.5...13.1)

3rd speed 1/min : 1500

Checkbk. volt. mV : 1500

Timing device

travel mm : max. 0.5
> mm : (max. 0.8)

Solenoid valve

Start of
injection, volts : 12

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2050

Checkbk. volt. mV : 3890

Measuring

temperature °C : 53

Overflow : 121...208

> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2050
Checkbk. volt mV : 190
Meßtemperatur °C :
Fuel delivery cm³/ : 3.5...51.9
> 1000s : (48.9...52.5)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.6...36.2)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2560
Measuring
temperature °C : 57
Fuel delivery cm³/ : 41.9...44.5
> 1000s : (41.2...45.2)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:

1st temperature-conditioning revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1800
Meßtemperatur °C : 57
Fuel delivery cm³/ : 7.7...11.7
> 1000s : (6.7...12.7)
Solenoid valve
Start of injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2420
Measuring
temperature °C : 61
Fuel delivery cm³/ : 35.7...45.7
> 1000s : (32.7...48.7)

Solenoid valve

Start of injection, volts : 12

Stop test:

Speed 1/min : 1000
Checkbk. volt mV : 4000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of
Shutoff solenoid:
Cut-in voltage
min. > volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : Audi
 Date of manufacture :
 Edition : 11.10.1996
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE4/10E2075R638-3

 Type No. : 0 460 404 969
 Customer Ident. No. :

 Customer-specific details
 Customer : Audi

 Engine : 1.9 TDI

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

 Inlet pressure, bar : 0.30...0.40

 Calibrating nozzle-holder assembly > : 1 688 901 114

 Opening pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 018

 Test line (fuel-delivery actuator) : 0 986 612 439

 Test line : 0 986 611 983
 Solenoid valve start of injection) : (KDEP 1190)

TEST PRECONDITIONS

 Test oil return temp. > °C with thermometer : 55

 Test oil supply temperature > °C : 42...47

 Hold-up revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator
 Connections 5 and 6
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

 Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground, Mohms min. : 1.0
 Connections 3 and 5 Mohms min. : 1.0
 Connections 6 and 7 Mohms min. : 1.0

 High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2 Ohms : 4.9...6.5
 Connections 2 and 3 Ohms : 4.9...6.5
 Connections 1 and 3 Ohms : 9.8...13.0

 Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

 Temperature sensor, fuel Connentions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

 Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0

 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

 Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2560

Setting value, bar : 8.4...9.2

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2510

Setting value, mm : 10.1...10.3

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2480

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 34.7...35.1

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2050

Checkbk. volt

mV : 3890

Supply pump

pressure > bar : 10.9...11.9

> bar :

2st speed 1/min : 300

Checkbk. volt

mV : 2560

Supply pump

pressure > bar : 6.6...8.0

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2510

Timing device

travel mm :
> mm : (9.2...11.2)

2nd speed 1/min : 2050

Checkbk. volt. mV : 3330

Timing device

travel mm : 11.8...12.8
> mm : (11.5...13.1)

3rd speed 1/min : 1500

Checkbk. volt. mV : 1500

Timing device

travel mm : max. 0.5
> mm : (max. 0.8)

Solenoid valve

Start of
injection, volts : 12

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2050

Checkbk. volt. mV : 3890

Measuring

temperature °C : 53

Overflow : 121...208

> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2050
Checkbk. volt mV : 3890
Meßtemperatur °C : 53
Fuel delivery cm³/ : 49.5...51.9
> 1000s : (48.9...52.5)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.6...36.2)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2560
Measuring
temperature °C : 57
Fuel delivery cm³/ : 41.9...44.5
> 1000s : (41.2...45.2)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1800
Meßtemperatur °C : 57
Fuel delivery cm³/ : 7.7...11.7
> 1000s : (6.7...12.7)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2420
Measuring
temperature °C : 61
Fuel delivery cm³/ : 35.7...45.7
> 1000s : (32.7...48.7)
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 1000
Checkbk. volt mV : 4000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:	3.6...3.8
KF	mm	:	8.2...8.6
SVS max.	mm	:	
FH	mm	:	
TS		:	1 467 010 495

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture:
 Edition : 18.02.1997
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE4/10E2250R590-3

 Type No. : 0 460 404 970
 Customer Ident.No. :

 Customer-specific details
 Customer : VW

 Engine : 1.9 TDI EDC

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

 Inlet pressure, bar : 0.30...0.40

 Calibrating nozzle-holder assembly > : 1 688 901 114

 Opening pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 018

 Test line (fuel-delivery actuator) : 0 986 612 439

 Test line (solenoid valve start of injection) : (KDEP 1190)

TEST PRECONDITIONS

 Test oil return temp. > °C with thermometer : 55

 Test oil supply temperature > °C : 42...47

 Hold-up revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator
 Connections 5 and 6
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

 Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground, Mohms min. : 1.0
 Connections 3 and 5 Mohms min. : 1.0
 Connections 6 and 7 Mohms min. : 1.0

 High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2 Ohms : 4.9...6.5
 Connections 2 and 3 Ohms : 4.9...6.5
 Connections 1 and 3 Ohms : 9.8...13.0

 Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

 Temperature sensor, fuel
 Connentions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

 Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0

 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

 Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2450

Setting value, bar : 7.3...8.7

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2450

Setting value, mm : 9.7...9.9

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2420

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 37.2...37.6

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100

Checkbk. volt

mV : 4000

Supply pump

pressure > bar : 9.7...11.1
> bar : (9.6...11.2)

2st speed 1/min : 300

Checkbk. volt

mV : 2450

Supply pump

pressure > bar : 6.6...8.1
> bar : (6.4...8.2)

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2450

Timing device

travel mm :
> mm : (8.8...10.8)

2nd speed 1/min : 2000

Checkbk. volt. mV : 4000

Timing device

travel mm : 11.2...12.9
> mm : (11.4...13.0)

3rd speed 1/min : 2100

Checkbk. volt. mV : 1310

Timing device

travel mm : max. 0.5
> mm : (max. 0.8)

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 300

Checkbk. volt. mV : 2450

Timing device

travel mm : 6.5...9.7
> mm : (6.1...10.1)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2100

Checkbk. volt. mV : 4000

Measuring

temperature °C : 53

Overflow : 97...208

> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 4000
Meßtemperatur °C : 53
Fuel delivery cm³/ : 54.2...57.2
> 1000s : (53.9...57.5)
Dispersion cm³/ : 2.5
> 1000s. : (2.5)

2nd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2420
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (36.1...38.7)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ : 43.6...46.6
> 1000s : (42.8...47.4)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1550
Meßtemperatur °C : 57
Fuel delivery cm³/ : 6.8...11.8
> 1000s : (6.3...12.3)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2310
Measuring
temperature °C : 61
Fuel delivery cm³/ : 36.0...48.0
> 1000s : (34.0...50.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 750
Checkbk. volt mV : 3650
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:

Cut-in voltage
min. > volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	: 6.2...6.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture:
 Edition : 28.10.1996
 Replaces :
 Test oil : ISO 4113

Injection pump : VE4/10E2250R510-3

Type No. : 0 460 404 971
 Customer Ident. No. :

Customer-specific details

Customer : VW

Engine : 1.9 TDI EDC

Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 114

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 439
 (fuel-delivery actuator) : (KDEP 1865/10)

Test line : 0 986 611 983
 (solenoid valve start of injection) : (KDEP 1190)

TEST PRECONDITIONS

Test oil
 return temp. > °C
 with thermometer : 55

Test oil supply
 temperature > °C : 42...47

Hold-up revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator

Connections 5 and 6

Test temperature:

15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground, Mohms min. : 1.0
 Connections 3 and 5 Mohms min. : 1.0
 Connections 6 and 7 Mohms min. : 1.0

High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2 Ohms : 4.9...6.5
 Connections 2 and 3 Ohms : 4.9...6.5
 Connections 1 and 3 Ohms : 9.8...13.0

Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
 Connections 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2245

Setting value, bar : 6.0...7.4

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2245

Setting value, mm : 10.7...10.9

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2480

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 38.8...39.2

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000

Checkbk. volt

mV : 3890

Supply pump

pressure > bar : 8.2...9.6
> bar : (8.1...9.7)

2st speed 1/min : 150

Checkbk. volt

mV : 2230

Supply pump

pressure > bar : min. 3.5
> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2245

Timing device

travel mm :
> mm : (8.6...11.8)

2nd speed 1/min : 2000

Checkbk. volt. mV : 3890

Timing device

travel mm : 11.5...12.9
> mm : (11.6...13.0)

3rd speed 1/min : 1400

Checkbk. volt. mV : 1475

Timing device

travel mm : max. 0.5
> mm : (max. 0.8)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 300

Checkbk. volt. mV : 2245

Timing device

travel mm : 8.8...11.6
> mm : (8.6...11.8)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2000

Checkbk. volt. mV : 3890

Measuring

temperature °C : 53

Overflow > cm³/10s : 97...180

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3890
Meßtemperatur °C : 53
Fuel delivery cm³/ : 48.2...51.2
> 1000s : (47.9...51.5)
Dispersion cm³/ : 2.5
> 1000s. : (2.5)

2nd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.7...40.3)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2245
Measuring
temperature °C : 57
Fuel delivery cm³/ : 36.8...39.8
> 1000s : (36.0...40.6)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1600
Meßtemperatur °C : 57
Fuel delivery cm³/ : 11.7...17.3
> 1000s : (11.5...17.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2230
Measuring
temperature °C : 61
Fuel delivery cm³/ : 30.5...42.5
> 1000s : (28.5...44.5)

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 750
Checkbk. volt mV : 2480
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of
Shutoff solenoid:
Cut-in voltage
min. > volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	: 6.2...6.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

BOSCH INJECTION PUMP TEST SPECIFICATIONS		ELECTRICAL TEST
Observe notes in remark column		Actuator
Test sheet	: Skoda	Connections 5 and 6
Date of manufacture:		Test temperature: 15°...30°C, ohms : 0.4...1.0
Edition	: 03.03.1997	50°...70°C, ohms : 0.45...1.1
Replaces	:	Connections 5 and 6 and ground, Mohms min. : 1.0
Test oil	: ISO 4113	Connections 6 and ground, Mohms min. : 1.0
Injection pump	: VE4/10E2100R724	Connections 3 and 5 Mohms min. : 1.0
Type No.	: 0 460 404 972	Connections 6 and 7 Mohms min. : 1.0
Customer Ident.No. :		Customer-specific details
Customer	: Skoda	High-pressure compressor sensor
Engine	: 1.9 SDI EDC	Sensor coils
Output kW	:	Connections 1 and 2 Ohms : 4.9...6.5
Speed 1/min :		Connections 2 and 3 Ohms : 4.9...6.5
TEST BENCH PREREQUISITES		Connections 1 and 3 Ohms : 9.8...13.0
Inlet pressure, bar:		Connections 1 and 2 ground, Mohms min. : 1.0
Calibrating nozzle-holder assembly > :		Connections 2 and 3 ground, Mohms min. : 1.0
Opening pressure > bar :		Connections 3 and 4 ground, Mohms min. : 1.0
Test pressure line :		Temperature sensor, fuel Connentions 4 and 7
Outer diameter	: 6.00	Test temperature: 15°...30°C, kohms : 1.2...4.0
x wall thickness > :	2.20	50°...70°C, kohms : 0.3...1.2
x length > mm :	350	Overflow valve
Test line	: 0 986 612 444	Connections 4 and ground, Mohms min. : 1.0
(fuel-delivery actuator)		Connections 7 and ground Mohms min. : 1.0
Test line	: 1 687 011 208	Solenoid valve, start of injection
(solenoid valve start of injection):	(Test cable set)	Connections 1 and 2
TEST PRECONDITIONS		Test temperature: 15°...30°C, ohms : 14.3...17.3
Test oil return temp. > °C		50°...70°C, ohms : 15.5...21.0
with thermometer	: 55	Starting stop mV : 4120...4650
Test oil supply temperature > °C	: 42...47	Shutoff stop mV : 650...850
Hold-up revolutions >1/min :	1200	
Feedback voltage mV	: 2500	

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2510
Setting value, bar : 7.3...8.7

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2510
Setting value, mm : 9.7...9.9

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt
mV : 2650
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 36.2...36.6
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:
1st speed 1/min : 2100
Checkbk. volt
mV : 3330
Supply pump
pressure > bar : 10.0...11.4
> bar :

2st speed 1/min : 300
Checkbk. volt
mV : 2510
Supply pump
pressure > bar : 6.3...8.7
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2510
Timing device
travel mm :
> mm : (8.8...10.8)

2nd speed 1/min : 2100
Checkbk. volt. mV : 3330
Timing device
travel mm : 11.6...13.0
> mm : (11.5...13.1)

3rd speed 1/min : 2100
Checkbk. volt. mV : 1600
Timing device
travel mm : max. 3.0
> mm : (max. 3.0)

Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 300
Checkbk. volt. mV : 2510
Timing device
travel mm : 6.0...11.0
> mm : (5.1...11.9)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt. mV : 3330
Measuring
temperature °C : 53
Overflow : 125...208
> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
 revolution 1/min : 100
 Checkbk. volt mV : 2500
 Output
 temperature °C : 51
 Speed 1/min : 2100
 Checkbk. volt mV : 3330
 Meßtemperatur °C : 53
 Fuel delivery cm³/ : 36.3...39.3
 > 1000s : (36.0...39.6)
 Dispersion cm³/ : 3.0
 > 1000s. : (3.0)

2nd temperature-conditioning

revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 800
 Checkbk. volt mV : 2550
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ :
 > 1000s : (35.1...37.7)
 Dispersion cm³/ :
 > 1000s : (2.5)

3rd temperature-conditioning

revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 500
 Checkbk. volt mV : 2510
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ : 36.9...39.9
 > 1000s : (36.4...40.4)
 Dispersion cm³/ : 3.0
 > 1000s : (3.0)

Idle delivery:

1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 400
 Checkbk. volt mV : 1820
 Meßtemperatur °C : 57
 Fuel delivery cm³/ : 7.3...12.3
 > 1000s : (6.8...12.8)
 Solenoid valve
 Start of
 injection, volts : 12
 Dispersion cm³/ : 3.0
 > 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 65
 Speed 1/min : 100
 Checkbk. volt mV : 2820
 Measuring
 temperature °C : 61
 Fuel delivery cm³/ : 42.0...56.0
 > 1000s : (41.0...57.0)
 Solenoid valve
 Start of
 injection, volts : 12

Stop test:

Speed 1/min : 1000
 Checkbk. volt mV : 3330
 ELAB volts : 0
 Fuel delivery cm³/ :
 max. 1000s : 3.0
 Start of

Shutoff solenoid:

Cut-in voltage
 min. > volts : 10.0
 Rated voltage,
 volts : 12.0

Notes:

High-pressure compressor sensor
 Testing only possible with ballast
 EPS 910

Take note of test instructions
 "Distributor pump for direct
 injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : ROW
Date of manufacture:
Edition : 06.12.1996
Replaces :
Test oil : ISO 4113

Injection pump : VE4/10E2100L720

Type No. : 0 460 404 973
Customer Ident.No. :

Customer-specific details
Customer : ROW

Engine : TCIE Job 3

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar: 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 114

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 0 986 612 437

Test line :
(fuel-delivery actuator)

Test line : 0 986 611 438
(solenoid valve start of injection)

TEST PRECONDITIONS

Test oil return temp. > °C
with thermometer : 55

Test oil supply temperature > °C : 42...47

Hold-up revolutions >1/min : 1200
Feedback voltage mV : 2500

Actuator
Connections 5 and 6
Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 5 and ground, Mohms min. : 1.0

Connections 6 and ground, Mohms min. : 1.0

Connections 3 and 5 Mohms min. : 1.0

Connections 6 and 7 Mohms min. : 1.0

High-pressure compressor sensor Sensor coils

Connections 1 and 2 Ohm : 4.9...6.5

Connections 2 and 3 Ohm : 4.9...6.5

Connections 1 and 3 Ohm : 9.8...13.0

Connections 1 and ground, Mohms min. : 1.0

Connections 2 and ground, Mohms min. : 1.0

Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel Connentions 4 and 7
Test temperature:
 15°...30°C, kohms : 1.2...4,0
 50°...70°C, kohms : 0.3...1.2

Connections 4 and ground, Mohms min. : 1.0

Connections 7 and ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 700

Checkbk. volt.

mV : 2200

Setting value, bar : 8.1...9.5

Timing device travel:

Speed 1/min : 700

Checkbk. volt

mV : 2200

Setting value, mm : 10.6...10.8

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 700

Checkbk. volt

mV : 2200

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 29.2...30.2

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000

Checkbk. volt

mV : 3880

Supply pump

pressure > bar : 10.0...11.4

> bar :

2st speed 1/min : 300

Checkbk. volt

mV : 2420

Supply pump

pressure > bar : 6.2...8.6

> bar :

Timing device variations:

1st speed 1/min : 400

Checkbk. volt. mV : 2420

Timing device

travel mm : 7.9...11.5
> mm : (7.2...12.2)

2nd speed 1/min : 2100

Checkbk. volt. mV : 3880

Timing device

travel mm : 11.8...12.8
> mm : (11.7...12.9)

3rd speed 1/min : 1500

Checkbk. volt. mV : 1460

Timing device

travel mm : max. 1.0
> mm : (max. 1.5)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 700

Checkbk. volt. mV : 2200

Timing device

travel mm :
> mm : (9.7...11.7)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2000

Checkbk. volt. mV : 3880

Measuring

temperature °C : 53

Overflow : 111...194

> cm³/10 :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt mV : 3880
Meßtemperatur °C : 53
Fuel delivery cm³/ : 52.9...55.9
> 1000s : (52.4...56.4)
Dispersion cm³/ : 2.5
> 1000s. : (3.0)

2nd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 700
Checkbk. volt mV : 2200
Measuring
temperature °C : 56
Fuel delivery cm³/ :
> 1000s : (28.5...31.5)
Dispersion cm³/ :
> 1000s : (3.0)

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2420
Measuring
temperature °C : 57
Fuel delivery cm³/ : 41.4...44.4
> 1000s : (40.9...44.9)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 450
Checkbk. volt mV : 1950
Meßtemperatur °C : 57
Fuel delivery cm³/ : 18.0...23.0
> 1000s : (17.5...23.5)
Dispersion cm³/ : 3.0
> 1000s. : (4.0)

Solenoid valve

Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s :

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2570
Measuring
temperature °C : 61
Fuel delivery cm³/ : 44.0...60.0
> 1000s : (41.0...63.0)

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 1000
Checkbk. volt mV : 2250
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
min. > volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:	3,6..3,8
KF	mm	:	
SVS max.	mm	:	
FH	mm	:	
TS		:	2 467 010 004

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : Nissan
 Date of manufacture :
 Edition : 02.10.1996
 Replaces :
 Test oil : ISO 4113
 Injection pump : VE4/10E2100L715
 Type No. : 0 460 404 974
 Customer Ident.No. :

Customer-specific details
 Customer : Nissan

Engine : TD 27 Ti
 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 022

Opening pressure > bar : 130...133

Test pressure line : 1 680 750 073

Outer diameter : 6.00
 x wall thickness > : 2.00
 x length > mm : 450

Overflow valve :

Overflow valve :

Test line : 0 986 612 442
 (fuel-delivery actuator)Test line : 1 687 011 208
 (solenoid valve
 start of injection) : (Test cable set)

Actuator
 Connections 4 and 7
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground, Mohms min. : 1.0
 Connections 2 and 7 Mohms min. : 1.0
 Connections 4 and 6 Mohms min. : 1.0

High-pressure compressor sensor
 Sensor coils
 Connections 1 and 3 ohms : 4.9...6.5
 Connections 2 and 3 ohms : 4.9...6.5
 Connections 1 and 2 ohms : 9.8...13.0

Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
 Connections 5 and 6
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground Mohms min. : 1.0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 1050

Checkbk. volt.

mV : 3080

Setting value, bar : 7.5...8.3

Timing device travel:

Speed 1/min : 1050

Checkbk. volt

mV : 3080

Setting value, mm : 10.7...10.9

Full-load delivery :

Speed 1/min : 1250

Checkbk. volt

mV : 2170

Fuel delivery cm³/

> 1000s : 28.3...28.7

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2200

Checkbk. volt

mV : 2810

Supply pump

pressure > bar : 9.4...10.8
> bar : (9.4...10.8)

2st speed 1/min : 1050

Checkbk. volt

mV : 3080

Supply pump

pressure > bar :
> bar : (7.2...8.6)

3st speed 1/min : 500

Checkbk. volt

mV : 2640

Supply pump

pressure > bar : 6.7...7.7
> bar : (6.4...8.0)

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 2640

Timing device

travel mm : 6.6...10.4
> mm : (6.1...11.1)

3rd speed 1/min : 1050

Checkbk. volt. mV : 1750

Timing device

travel mm : max. 0.4
> mm : (max. 0.6)

Solenoid valve

Start of
injection, volts : 12

4nd speed 1/min : 2200

Checkbk. volt. mV : 2810

Timing device

travel mm : 11,7...12,9
> mm : (11,5...13,1)

Overflow at overflow valve:

Speed 1/min : 2200

Checkbk. volt. mV : 2810

Overflow : 111...222
> cm³/10s :

Fuel delivery variations:

1. Speed 1/min : 2200
Checkbk. volt mV : 2810
Fuel delivery cm³/ : 54.1...56.7
> 1000s : (52.9...57.9)
Dispersion cm³/ : 2.5
> 1000s. :

2. Speed 1/min : 1250
Checkbk. volt mV : 2170
Fuel delivery cm³/ :
> 1000s : (26.7...30.3)
Dispersion cm³/ :
> 1000s :

3. Speed 1/min : 500
Checkbk. volt mV : 2640
Fuel delivery cm³/ : 48.3...52.1
> 1000s : (47.7...52.7)
Dispersion cm³/ :
> 1000s :

Idle delivery:

Speed 1/min : 400
Checkbk. volt mV : 1870
Fuel delivery cm³/ : 7.0...11.6
> 1000s : (6.3...12.3)
Solenoid valve
Start of injection, volts : 12
Dispersion cm³/ : 2.0
> 1000s : (3.0)

Starting fuel delivery:
Speed 1/min : 100
Checkbk. volt mV : 3300
Fuel delivery cm³/ : 69.5...81.5
> 1000s : (66.5...84.5)
Solenoid valve
Start of injection, volts : 12

Stop test:
Speed 1/min : 1500
Checkbk. volt mV : 4000
ELAB volts : 0
Fuel delivery cm³/ : max. 3.0
max. 1000s : (max. 3.0)

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observation notes in remark column

Test sheet : BMW
 Date of manufacture:
 Edition : 29.09.1993
 Replaces :
 Test oil : ISO 4113

Injection pump : VE6/10E2400R575

Type No. : 0 460 406 993
 Customer Ident. No. :

Customer-specific details

Customer : BMW

Engine : M51

Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar: 0.30...0.40

Calibrating nozzle-
holder assembly > : 1 688 901 022

Opening
pressure > bar : 130...133

Test pressure line : 1 680 750 073

Outer diameter : 6.00
 x wall thickness > : 2.00
 x length > mm : 450

Test line : 0 986 612 430
 (fuel-delivery actuator)

Test line : 0 986 612 435
 (solenoid valve
 start of injection)

Actuator

Connections 4 and 7

Test temperature:

15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 4 and.

ground, Mohms min. : 1.0

Connections 7 and

ground, Mohms min. : 1.0

Connections 2 and 7

Mohms min. : 1.0

Connections 4 and 6

Mohms min. : 1.0

Control-collar travel sensor

Test temperature :

15°...70°C

Connections 1 and 3

kohms : 0,5...2,0

Connections 2 and 3

kohms : 1,0...3,0

Connections 1 and.

ground, Mohms min. : 1.0

Connections 2 and

ground, Mohms min. : 1.0

Connections 3 and

ground, Mohms min. : 1.0

Temperature sensor, fuel

Connections 5 and 6

Test temperature:

15°...30°C, kohms : 1.2...4.0

50°...70°C, kohms : 0.3...1.2

Connections 5 and

ground, Mohms min. : 1.0

Connections 6 and

ground Mohms min. : 1.0

Solenoid valve, start of injection

Connections 1 and 2

Test temperature :

15°...30°C, ohms : 14.3...17.3

50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

**Setting values of injection pump
Check values in brackets**

Supply pump pressure:

Speed 1/min : 1500

Checkbk. volt.

mV : 3000

Setting value, bar : 7.2...7.8

Timing device travel:

Speed 1/min : 1500

Checkbk. volt

mV : 3000

Setting value, mm : 8.4...8.8

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 1500

Checkbk. volt

mV : 3000

Fuel delivery cm³/

> 1000s : 44.4...44.8

Dispersion cm³/ : 2.0

> 1000s :

Test specifications of injection pump

Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2400

Checkbk. volt

mV : 3000

Supply pump

pressure > bar : 8.6...9.4

> bar : (8.8...9.5)

2st speed 1/min : 350

Checkbk. volt

mV : 3850

Supply pump

pressure > bar : 5.6...6.2

> bar : (5.4...6.4)

Timing device variations:

1st speed 1/min : 350

Checkbk. volt. mV : 3850

Timing device

travel mm : 5.0...6.4

> mm : (4.7...6.7)

2nd speed 1/min : 1500

Checkbk. volt. mV : 3000

Timing device

travel mm :

> mm : (7.9...9.3)

3rd speed 1/min : 1500

Checkbk. volt. mV : 3000

Timing device

travel mm : 0.0...0.4

> mm :

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 2300

Checkbk. volt. mV : 3000

Timing device

travel mm : 9.5...10.1

> mm : (9.3...10.3)

5.th speed 1/min : 150

Checkbk. volt. mV : 3850

Timing device

travel mm : 2.7...5.1

> mm : (1.9...5.9)

Overflow at overflow valve:

Speed 1/min : 2400

Checkbk. volt. mV : 3000

Overflow : 69...180

> cm³/10s :

Fuel delivery variations:

1. Speed 1/min : 2400
Checkbk. volt mV : 3000
Fuel delivery cm³/ : 44.8...46.8
> 1000s : (43.3...48.3)
Dispersion cm³/ : 2.5
> 1000s. : (2.5)

2. Speed 1/min : 1500
Checkbk. volt mV : 3000
Fuel delivery cm³/ :
> 1000s : (42.8...46.4)
Dispersion cm³/ :
> 1000s : (2.0)

3. Speed 1/min : 1000
Checkbk. volt mV : 3100
Fuel delivery cm³/ : 45.9...47.9
> 1000s : (44.4...52.4)
Dispersion cm³/ : 2.0
> 1000s : (2.0)

4. Speed 1/min : 1000
Checkbk. volt mV : 2350
Fuel delivery cm³/ : 13.3...14.5
> 1000s : (11.6...16.2)
Dispersion cm³/ : 2.0
> 1000s : (2.0)

5. Speed 1/min : 500
Checkbk. volt mV : 3000
Fuel delivery cm³/ : 30.2...32.2
> 1000s : (28.7...37.7)
Dispersion cm³/ : 2.0
> 1000s : (2.0)

Idle delivery:

Speed 1/min : 350
Checkbk. volt mV : 2600
Fuel delivery cm³/ : 7.0...9.0
> 1000s : (5.5...10.5)
Solenoid valve
Start of injection, volts : 12
Dispersion cm³/ : 2.0
> 1000s : (2.0)

Starting fuel delivery:
Speed 1/min : 100
Checkbk. volt mV : 3680
Fuel delivery cm³/ : 33.0...45.0
> 1000s : (30.0...48.0)
Solenoid valve
Dispersion cm³/ :
> 1000s :
Start of injection, volts : 12

Stop test:
Speed 1/min : 2400
Checkbk. volt mV : 3000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:
Cut-in voltage min.> volts : 10.0
Rated voltage, volts : 12.0

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:
Prestroke..	mm	: 0,28...0,32
		: (0,26...0,34)

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : BMW
 Date of manufacture:
 Edition : 15.10.1996
 Replaces :
 Test oil : ISO 4113

Injection pump : VE6/10E2200R515

Type No. : 0 460 406 994
 Customer Ident.No. :

Customer-specific details

Customer : BMW

Engine : M51

Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar: 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 022

Opening pressure > bar : 130...133

Test pressure line : 1 680 750 073

Outer diameter : 6,00
 x wall thickness > : 2.00
 x length > mm : 450

Overflow valve :

Test line : 0 986 612 430
 (fuel-delivery actuator)Test line : 0 986 612 435
 (solenoid valve
 start of injection)

Actuator

Connections 4 and 7

Test temperature:

15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground, Mohms min. : 1.0
 Connections 2 and 7 Mohms min. : 1.0
 Connections 4 and 6 Mohms min. : 1.0

High-pressure compressor sensor
 Sensor coils
 Connections 1 and 3 kohms : 4.9...6.5
 Connections 2 and 3 kohms : 4.9...6.5
 Connections 1 and 2 kohms : 9.8...13.0

Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
 Connentions 5 and 6
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground Mohms min. : 1.0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 1500

Checkbk. volt.

mV : 2820

Setting value, bar : 7.3...8.1

Timing device travel:

Speed 1/min : 1500

Checkbk. volt

mV : 2820

Setting value, mm : 8.5...8.7

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 1500

Checkbk. volt

mV : 2820

Fuel delivery cm³/

> 1000s : 45.1...45.5

Dispersion cm³/ : 2.0

> 1000s :

Test specifications of injection pump

Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2400

Checkbk. volt

mV : 2520

Supply pump

pressure > bar : 8.8...9.8

> bar :

2st speed 1/min : 350

Checkbk. volt

mV : 3470

Supply pump

pressure > bar : 5.3...6.5

> bar :

Timing device variations:

1st speed 1/min : 350

Checkbk. volt. mV : 3470

Timing device

travel mm : 5.0...6.4

> mm : (4.4...7.0)

2nd speed 1/min : 1500

Checkbk. volt. mV : 2820

Timing device

travel mm :

> mm : (7.8...9.4)

3rd speed 1/min : 1500

Checkbk. volt. mV : 2820

Timing device

travel mm : 0.0...0.4

> mm :

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 2300

Checkbk. volt. mV : 2820

Timing device

travel mm : 9.5...10.1

> mm : (9.3...10.3)

5.th speed 1/min : 150

Checkbk. volt. mV : 3470

Timing device

travel mm : 2.7...5.1

> mm : (1.9...5.9)

Overflow at overflow valve:

Speed 1/min : 2400

Checkbk. volt. mV : 2820

Overflow : 69...180

> cm³/10s :

Fuel delivery variations:

1. Speed 1/min : 2400
Checkbk. volt mV : 2820
Fuel delivery cm³/ : 45.4...48.0
> 1000s : (44.2...49.2)
Dispersion cm³/ : 2.5
> 1000s. :

2. Speed 1/min : 1500
Checkbk. volt mV : 2820
Fuel delivery cm³/ :
> 1000s : (44.0...46.0)
Dispersion cm³/ :
> 1000s : (3.0)

3. Speed 1/min : 1000
Checkbk. volt mV : 2910
Fuel delivery cm³/ : 46.6...48.6
> 1000s : (45.6...49.6)
Dispersion cm³/ : 2.0
> 1000s : (3.0)

4. Speed 1/min : 1000
Checkbk. volt mV : 2170
Fuel delivery cm³/ : 14.4...15.8
> 1000s : (13.8...16.4)
Dispersion cm³/ : 2.0
> 1000s :

5. Speed 1/min : 5000
Checkbk. volt mV : 2820
Fuel delivery cm³/ : 30.5...33.1
> 1000s : (29.8...33.8)
Dispersion cm³/ : 2.0
> 1000s :

Idle delivery:

Speed 1/min : 350
Checkbk. volt mV : 2430
Fuel delivery cm³/ : 8.8...11.4
> 1000s : (7.6...12.6)

Solenoid valve

Start of injection, volts : 12
Dispersion cm³/ : 2.0
> 1000s : (3.0)

Starting fuel delivery:

Speed 1/min : 100
Checkbk. volt mV : 3470
Fuel delivery cm³/ :
> 1000s : 33.0

Solenoid valve

Start of injection, volts : 12

Stop test:

Speed 1/min : 500
Checkbk. volt mV : 2820
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage min.> volts : 10.0
Rated voltage, volts : 12.0

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:
Prestroke..	mm	: 0,28...0,32
		: (0,26...0,34)

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Observe notes in remark column

Test sheet : VW
 Date of manufacture :
 Edition : 09.08.1996
 Replaces :
 Test oil : ISO 4113

 Injection pump : VE4/11E2075R712

 Type No. : 0 460 414 990
 Customer Ident.No. :

 Customer-specific details
 Customer : VW

 Engine : 1.9 TDI

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

 Calibrating nozzle-
 holder assembly > : 1 688 901 114

 Opening
 pressure > bar : 207...210

 Test pressure line : 1 680 750 085

 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

 Overflow valve : 2 467 413 018

 Test line : 0 986 612 444
 (fuel-delivery
 actuator) :

 Test line : 1 687 011 208
 (solenoid valve
 start of injection) : (Test cable set)

TEST PRECONDITIONS

Test oil
 return temp. > °C
 with thermometer : 55

 Test oil supply
 temperature > °C : 42...47

 Hold-up
 revolutions >1/min : 1200
 Feedback
 voltage mV : 2500

ELECTRICAL TEST

Actuator
 Connections 5 and 6
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

 Connections 5 and
 ground, Mohms min. : 1.0
 Connections 6 and
 ground, Mohms min. : 1.0
 Connections 3 and 5
 Mohms min. : 1.0
 Connections 6 and 7
 Mohms min. : 1.0

 High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2
 Ohms : 4.9...6.5
 Connections 2 and 3
 Ohms : 4.9...6.5
 Connections 1 and 3
 Ohms : 9.8...13.0

 Connections 1 and
 ground, Mohms min. : 1.0
 Connections 2 and
 ground, Mohms min. : 1.0
 Connections 3 and
 ground, Mohms min. : 1.0

 Temperature sensor, fuel
 Connentions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

 Connections 4 and
 ground, Mohms min. : 1.0
 Connections 7 and
 ground Mohms min. : 1.0

 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

 Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 750

Checkbk. volt.

mV : 2340

Setting value, bar : 8.4...8.6

Timing device travel:

Speed 1/min : 750

Checkbk. volt

mV : 2340

Setting value, mm : 11.9...12.7

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2340

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 38.3...38.7

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000

Checkbk. volt

mV : 3790

Supply pump

pressure > bar : 10.4...11.0

> bar :

2st speed 1/min : 300

Checkbk. volt

mV : 2450

Supply pump

pressure > bar : 5.6...7.2

> bar :

Timing device variations:

1st speed 1/min : 400

Checkbk. volt. mV : 2450

Timing device

travel mm : 9.8...11.2
> mm : (8.0...14.0)

2nd speed 1/min : 2000

Checkbk. volt. mV : 3790

Timing device

travel mm : 11.8...12.8
> mm : (11.5...13.1)

3rd speed 1/min : 1300

Checkbk. volt. mV : 1400

Timing device

travel mm : max. 0.3
> mm : (max. 1.0)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 750

Checkbk. volt. mV : 2340

Timing device

travel mm :
> mm : (11.5...13.1)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2000

Checkbk. volt. mV : 3790

Measuring

temperature °C : 53

Overflow : 133...188

> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
 revolution 1/min : 100
 Checkbk. volt mV : 2500
 Output
 temperature °C : 51
 Speed 1/min : 2000
 Checkbk. volt mV : 3790
 Meßtemperatur °C : 53
 Fuel delivery cm³/ : 60.3...62.7
 > 1000s : (59.7...63.3)
 Dispersion cm³/ : 3.0
 > 1000s. : (3.0)

2nd temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 750
 Checkbk. volt mV : 2340
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ :
 > 1000s : (37.0...40.0)
 Dispersion cm³/ :
 > 1000s : (3.0)

3rd temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 1000
 Checkbk. volt mV : 3070
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ : 55.8...58.2
 > 1000s : (55.2...58.8)
 Dispersion cm³/ :
 > 1000s :

4th temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 500
 Checkbk. volt mV : 2450
 Measuring
 temperature °C : 57
 Fuel delivery cm³/ : 47.2...49.8
 > 1000s : (46.5...50.5)
 Dispersion cm³/ : 3.0
 > 1000s : (3.0)

Idle delivery:

1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 61
 Speed 1/min : 400
 Checkbk. volt mV : 1760
 Meßtemperatur °C : 57
 Fuel delivery cm³/ : 14.5...18.5
 > 1000s : (13.5...19.5)
 Solenoid valve
 Start of
 injection, volts : 12
 Dispersion cm³/ : 3.0
 > 1000s : (4.0)

Starting fuel delivery:
 1st temperature-conditioning
 revolution 1/min : 2000
 Checkbk. volt mV : 2500
 Output
 temperature °C : 65
 Speed 1/min : 100
 Checkbk. volt mV : 2450
 Measuring
 temperature °C : 61
 Fuel delivery cm³/ : 48.0...60.0
 > 1000s : (44.0...64.0)

Solenoid valve

Start of
 injection, volts : 12

Stop test:

Speed 1/min : 1200
 Checkbk. volt mV : 2340
 ELAB volts : 0
 Fuel delivery cm³/ :
 max. 1000s : 3.0
 Start of

Shutoff solenoid:

Cut-in voltage
 min.> volts : 10.0
 Rated voltage,
 volts : 12.0

Notes:

High-pressure compressor sensor
 Testing only possible with ballast
 EPS 910

Take note of test instructions
 "Distributor pump for direct
 injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:
TS		: 2 467 010 004

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : ROW
 Date of manufacture :
 Edition : 15.11.1996
 Replaces :
 Test oil : ISO 4113
 Injection pump : VE4/11E2000R500-1
 Type No. : 0 460 414 991
 Customer Ident.No. :

Customer-specific details
 Customer : ROW

Engine : Gemini 3

Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-
 holder assembly > : 1 688 901 116

Opening
 pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

Overflow valve :

Test line : 0 986 612 437
 (fuel-delivery actuator)

Test line : 0 986 612 438
 (solenoid valve
 start of injection)

TEST PRECONDITIONS

Test oil
 return temp. > °C
 with thermometer : 55

Test oil supply
 temperature > °C : 42...47

Hold-up
 revolutions >1/min : 1200
 Feedback
 voltage mV : 2500

Actuator

Connections 5 and 6

Test temperature:

15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 5 and
 ground, Mohms min. : 1.0
 Connections 6 and
 ground, Mohms min. : 1.0
 Connections 3 and 5
 Mohms min. : 1.0
 Connections 6 and 7
 Mohms min. : 1.0

High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2
 Ohm : 4.9...6.5
 Connections 2 and 3
 Ohm : 4.9...6.5
 Connections 1 and 3
 Ohm : 9.8...13.0

Connections 1 and
 ground, Mohms min. : 1.0
 Connections 2 and
 ground, Mohms min. : 1.0
 Connections 3 and
 ground, Mohms min. : 1.0

Temperature sensor, fuel
 Conventions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

Connections 4 and
 ground, Mohms min. : 1.0
 Connections 7 and
 ground Mohms min. : 1.0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 1000

Checkbk. volt.

mV : 3500

Setting value, bar : 5.8...7.2

Timing device travel:

Speed 1/min : 1000

Checkbk. volt

mV : 3500

Setting value, mm : 8.9...9.1

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2430

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 53.9...54.3

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump

Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000

Checkbk. volt

mV : 3500

Supply pump

pressure > bar : 7.5...8.9

> bar :

2st speed 1/min : 150

Checkbk. volt

mV : 2870

Supply pump

pressure > bar : 3.5...6.5

> bar :

Timing device variations:

1st speed 1/min : 1000

Checkbk. volt. mV : 3500

Timing device

travel mm :

> mm : (8.0...10.0)

2nd speed 1/min : 2000

Checkbk. volt. mV : 3500

Timing device

travel mm :

> mm : (11.6...13.0)

3rd speed 1/min : 1000

Checkbk. volt. mV : 1560

Timing device

travel mm :

> mm : (max. 3.0)

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 500

Checkbk. volt. mV : 2870

Timing device

travel mm :

> mm : (5.8...8.8)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2000

Checkbk. volt. mV : 3500

Measuring

temperature °C : 53

Overflow : 97...153

> cm³/10s:

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3500
Meßtemperatur °C : 53
Fuel delivery cm³/ : 67.5...70.5
 > 1000s :
Dispersion cm³/ : 2.5
 > 1000s :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3200
Measuring
temperature °C : 56
Fuel delivery cm³/ : 77.9...80.9
 > 1000s : (77.4...81.4)
Dispersion cm³/ : 2.5
 > 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2430
Measuring
temperature °C : 57
Fuel delivery cm³/ :
 > 1000s : (52.4...55.8)
Dispersion cm³/ :
 > 1000s : (3.0)

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2870
Measuring
temperature °C : 57
Fuel delivery cm³/ : 85.4...89.0
 > 1000s : (84.9...89.5)
Dispersion cm³/ : 2.5
 > 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1750
Meßtemperatur °C : 57
Fuel delivery cm³/ : 19.9...24.9
 > 1000s : (19.4...25.4)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
 > 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 3130
Measuring
temperature °C : 61
Fuel delivery cm³/ : 83.0...99.0
 > 1000s : (80.0...102.0)

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 1200
Checkbk. volt mV : 3000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
 volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	: 6.5...6.9
SVS max.	mm	:
FH	mm	:
TS	mm	: 1 467 010 494

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : ROW
 Date of manufacture :
 Edition : 30.10.1995
 Replaces :
 Test oil : ISO 4113
 Injection pump : VE4/11E2250L580-1
 Type No. : 0 460 414 992
 Customer Ident.No. :

Customer-specific details
 Customer : ROVER

Engine : TCIE

Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-
 holder assembly > : 1 688 901 114

Opening
 pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

Overflow valve :

Test line : 0 986 612 437
 (fuel-delivery actuator)

Test line : 0 986 612 438
 (solenoid valve
 start of injection)

TEST PRECONDITIONS

Test oil
 return temp. > °C
 with thermometer : 55

Test oil supply
 temperature > °C : 42...47

Hold-up
 revolutions >1/min : 1200
 Feedback
 voltage mV : 2500

Actuator

Connections 5 and 6
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 5 and
 ground, Mohms min. : 1.0
 Connections 6 and
 ground, Mohms min. : 1.0
 Connections 3 and 5
 Mohms min. : 1.0
 Connections 6 and 7
 Mohms min. : 1.0

High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2
 Ohm : 4.9...6.5
 Connections 2 and 3
 Ohm : 4.9...6.5
 Connections 1 and 3
 Ohm : 9.8...13.0

Connections 1 and
 ground, Mohms min. : 1.0
 Connections 2 and
 ground, Mohms min. : 1.0
 Connections 3 and
 ground, Mohms min. : 1.0

Temperature sensor, fuel
 Conventions 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

Connections 4 and
 ground, Mohms min. : 1.0
 Connections 7 and
 ground Mohms min. : 1.0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 1000

Checkbk. volt.

mV : 3400

Setting value, bar : 6.6...7.9

Timing device travel:

Speed 1/min : 1000

Checkbk. volt

mV : 3400

Setting value, mm : 7.8...8.0

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2450

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 38.4...38.8

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump

Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2250

Checkbk. volt

mV : 3400

Supply pump
pressure > bar : 8.4...9.8

> bar :

2st speed 1/min : 500

Checkbk. volt

mV : 3400

Supply pump
pressure > bar : 6.0...7.2

> bar :

3st speed 1/min : 150

Checkbk. volt

mV : 2560

Supply pump
pressure > bar : 3.5...10.5

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 3400

Timing device

travel mm : 4.5...7.3
> mm : (3.9...7.9)

2nd speed 1/min : 2250

Checkbk. volt. mV : 3400

Timing device

travel mm : 9.4...10.2
> mm : (9.2...10.4)

3rd speed 1/min : 1500

Checkbk. volt. mV : 1650

Timing device

travel mm : max. 0.5
> mm : (max. 3.5)

Solenoid valve

Start of
injection, volts : 12

4.th speed 1/min : 1000

Checkbk. volt. mV : 3400

Timing device

travel mm :
> mm : (6.9...8.9)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2250

Checkbk. volt. mV : 3400

Measuring

temperature °C : 53

Overflow : 108...191

> cm³/10 :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2250
Checkbk. volt mV : 3400
Meßtemperatur °C : 53
Fuel delivery cm³/ : 41.7...44.3
> 1000s : (41.0...45.0)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1250
Checkbk. volt mV : 3200
Measuring
temperature °C : 56
Fuel delivery cm³/ : 48.9...51.9
> 1000s : (48.1...52.7)
Dispersion cm³/ : 3.0
> 1000s. :

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.1...40.1)
Dispersion cm³/ :
> 1000s : (3.0)

4th temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ : 44.6...47.2
> 1000s : (43.9...47.9)
Dispersion cm³/ : 3.0
> 1000s. :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1600
Meßtemperatur °C : 57
Fuel delivery cm³/ : 9.9...10.9
> 1000s : (7.4...13.4)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2560
Measuring
temperature °C : 61
Fuel delivery cm³/ : 43.5...57.5
> 1000s : (39.5...61.5)

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 1000
Checkbk. volt mV : 3400
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
min. > volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	: 6.5...6.9
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 494

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : Renault
 Date of manufacture :
 Edition : 22.05.1996
 Replaces :
 Test oil : ISO 4113
 Injection pump : VE4/11E2000R672
 Type No. : 0 460 414 993
 Customer Ident.No. :
 Customer-specific details
 Customer : Renault
 Engine : F 9 Q 730
 Output kW :
 Speed 1/min :
TEST BENCH PREREQUISITES
 Inlet pressure, bar : 0.30...0.40
 Calibrating nozzle-holder assembly > : 1 688 901 114
 Opening pressure > bar : 207...210
 Test pressure line : 1 680 750 085
 Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350
 Overflow valve : 2 467 413 018
 Test line : 0 986 612 434
 (fuel-delivery actuator) : (KDEP 1865/5)
 Test line : 0 986 612 435
 (solenoid valve start of injection) : (KDEP 1865/6)
TEST PRECONDITIONS
 Test oil return temp. > °C with thermometer : 55
 Test oil supply temperature > °C : 42...47
 Hold-up revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator
 Connections 4 and 7
 Test temperature:
 15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1
 Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground, Mohms min. : 1.0
 Connections 2 and 7 Mohms min. : 1.0
 Connections 4 and 6 Mohms min. : 1.0
 High-pressure compressor sensor
 Sensor coils
 Connections 1 and 3
 Ohm : 4.9...6.5
 Connections 2 and 3
 Ohm : 4.9...6.5
 Connections 1 and 2
 Ohm : 9.8...13.0
 Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0
 Temperature sensor, fuel
 Connentions 5 and 6
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2
 Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0
 Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0
 Starting stop mV : 4120...4650
 Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 500

Checkbk. volt.

mV : 2100

Setting value, bar : 6.9...8.1

Timing device travel:

Speed 1/min : 500

Checkbk. volt

mV : 2100

Setting value, mm : 10.9...11.1

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2480

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 35.8...36.2

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000

Checkbk. volt

mV : 3670

Supply pump

pressure > bar : 9.4...10.6

> bar :

2st speed 1/min : 200

Checkbk. volt

mV : 2100

Supply pump

pressure > bar : 5.0...7.0

> bar :

Timing device variations:

1st speed 1/min : 200

Checkbk. volt. mV : 2100

Timing device

travel mm : 4.9...8.9

> mm : (3.9...9.9)

2nd speed 1/min : 2000

Checkbk. volt. mV : 3670

Timing device

travel mm : 11.8...12.8

> mm : (11.5...13.1)

3rd speed 1/min : 1500

Checkbk. volt. mV : 1500

Timing device

travel mm : max. 1.0

> mm : (max. 1.2)

Solenoid valve

Start of
injection, volts : 12

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 2000

Checkbk. volt. mV : 3670

Measuring

temperature °C : 53

Overflow : 118...202

> cm³/10 :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3670
Meßtemperatur °C : 53
Fuel delivery cm³/ : 44.7...47.3
> 1000s : (44.0...48.0)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 1500
Checkbk. volt mV : 3490
Measuring
temperature °C : 53
Fuel delivery cm³/ : 46.8...19.8
> 1000s : (46.0...50.6)
Dispersion cm³/ : 3.0
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (34.5...37.5)
Dispersion cm³/ :
> 1000s : (3.0)

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2100
Measuring
temperature °C : 57
Fuel delivery cm³/ : 26.9...30.9
> 1000s : (25.9...31.9)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 550
Checkbk. volt mV : 1800
Meßtemperatur °C : 57
Fuel delivery cm³/ : 15.0...16.0
> 1000s : (12.5...18.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2640
Measuring
temperature °C : 61
Fuel delivery cm³/ : 42.0...58.0
> 1000s : (36.0...64.0)

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 900
Checkbk. volt mV : 3490
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
min. > volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

BOSCH INJECTION PUMP TEST SPECIFICATIONS		ELECTRICAL TEST
Observe notes in remark column		Actuator
Test sheet	: ROW	Connections 5 and 6
Date of manufacture:		Test temperature: 15°...30°C, ohms : 0.4...1.0
Edition	: 08.07.1994	50°...70°C, ohms : 0.45...1.1
Replaces	:	
Test oil	: ISO 4113	Connections 5 and ground, Mohms min. : 1.0
Injection pump	: VE4/11E2250L580	Connections 6 and ground, Mohms min. : 1.0
Type No.	: 0 460 414 995	Connections 3 and 5 Mohms min. : 1.0
Customer Ident.No.:		Connections 6 and 7 Mohms min. : 1.0
Customer-specific details		
Customer	: ROVER	High-pressure compressor sensor
Engine	: TCIE	Sensor coils
Output kW	:	Connections 1 and 2
Speed 1/min :		Ohm : 4.9...6.5
TEST BENCH PREREQUISITES		Connections 2 and 3
Inlet pressure, bar:	0.30...0.40	Ohm : 4.9...6.5
Calibrating nozzle-holder assembly > :	1 688 901 114	Connections 1 and ground, Mohms min. : 1.0
Opening pressure > bar :	207...210	Connections 2 and ground, Mohms min. : 1.0
Test pressure line :	1 680 750 085	Connections 3 and ground, Mohms min. : 1.0
Outer diameter :	6.00	
x wall thickness > :	2.20	Temperature sensor, fuel
x length > mm :	350	Connections 4 and 7
Overflow valve :		Test temperature: 15°...30°C, kohms : 1.2...4.0
Test line :	0 986 612 437 (fuel-delivery actuator)	50°...70°C, kohms : 0.3...1.2
Test line :	0 986 612 438 (solenoid valve start of injection)	Connections 4 and ground, Mohms min. : 1.0
TEST PRECONDITIONS		Connections 7 and ground Mohms min. : 1.0
Test oil return temp. > °C		Solenoid valve, start of injection
with thermometer	: 55	Connections 1 and 2
Test oil supply temperature > °C	: 42...47	Test temperature: 15°...30°C, ohms : 14.3...17.3
Hold-up revolutions >1/min :	1200	50°...70°C, ohms : 15.5...21.0
Feedback voltage mV	: 2500	Starting stop mV : 4120...4650
		Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 1000
Checkbk. volt.
mV : 3400
Setting value, bar : 6.9...7.7

Timing device travel:
Speed 1/min : 1000
Checkbk. volt
mV : 3400
Setting value, mm : 7.8...8.0

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 38.5...38.7
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2250
Checkbk. volt
mV : 3400
Supply pump
pressure > bar : 8.8...9.6
> bar :

2st speed 1/min : 500
Checkbk. volt
mV : 3400
Supply pump
pressure > bar : 6.2...7.0
> bar :

3st speed 1/min : 150
Checkbk. volt
mV : 2560
Supply pump
pressure > bar : 3.5...10.5
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 3400
Timing device
travel mm : 5.2...7.6
> mm : (4.4...8.4)

2nd speed 1/min : 2250
Checkbk. volt. mV : 3400
Timing device
travel mm : 9.4...10.2
> mm : (9.2...10.4)

3rd speed 1/min : 1500
Checkbk. volt. mV : 1650
Timing device
travel mm : max. 1.0
> mm : (max. 3.5)

Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 1000
Checkbk. volt. mV : 3400
Timing device
travel mm :
> mm : (6.9...8.9)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2250
Checkbk. volt. mV : 3400
Measuring
temperature °C : 53
Overflow : 83...167
> cm³/10 :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2250
Checkbk. volt mV : 3400
Meßtemperatur °C : 53
Fuel delivery cm³/ : 42.3...44.9
> 1000s : (41.6...45.6)
Dispersion cm³/ : 2.5
> 1000s. :

2nd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1250
Checkbk. volt mV : 3200
Measuring
temperature °C : 56
Fuel delivery cm³/ : 49.2...52.2
> 1000s : (48.4...53.0)
Dispersion cm³/ : 3.0
> 1000s :

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.1...40.1)
Dispersion cm³/ :
> 1000s : (3.0)

4th temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ : 44.4...47.0
> 1000s : (43.7...47.7)
Dispersion cm³/ : 2.0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1600
Meßtemperatur °C : 57
Fuel delivery cm³/ : 9.5...12.9
> 1000s : (8.2...14.2)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2560
Measuring
temperature °C : 61
Fuel delivery cm³/ : 43.5...57.5
> 1000s : (39.5...61.5)
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 1000
Checkbk. volt mV : 3400
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:
KF	mm	: 6.5...6.9
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 494

BOSCH INJECTION PUMP TEST SPECIFICATIONS

ELECTRICAL TEST

Observe notes in remark column

Test sheet : VW
 Date of manufacture:
 Edition : 12.06.1996
 Replaces:
 Test oil : ISO 4113

 Injection pump : VE5/11E1750L714

 Type No. : 0 460 415 986
 Customer Ident.No. :

 Customer-specific details
 Customer : VW

 Engine : 2.5 TDI

 Output kW :
 Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar: 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 114

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
 x wall thickness > : 2.20
 x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 444
 (fuel-delivery actuator)

Test line : 1 687 011 208
 (solenoid valve start of injection): (Test cable set)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer : 55

Test oil supply temperature > °C : 42...47

Hold-up revolutions >1/min : 1200
 Feedback voltage mV : 2500

Actuator

Connections 5 and 6

Test temperature:

15°...30°C, ohms : 0.4...1.0
 50°...70°C, ohms : 0.45...1.1

Connections 5 and ground, Mohms min. : 1.0
 Connections 6 and ground, Mohms min. : 1.0
 Connections 3 and 5 Mohms min. : 1.0
 Connections 6 and 7 Mohms min. : 1.0

High-pressure compressor sensor
 Sensor coils
 Connections 1 and 2 Ohms : 4.9...6.5
 Connections 2 and 3 Ohms : 4.9...6.5
 Connections 1 and 3 Ohms : 9.8...13.0

Connections 1 and ground, Mohms min. : 1.0
 Connections 2 and ground, Mohms min. : 1.0
 Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
 Connections 4 and 7
 Test temperature:
 15°...30°C, kohms : 1.2...4.0
 50°...70°C, kohms : 0.3...1.2

Connections 4 and ground, Mohms min. : 1.0
 Connections 7 and ground Mohms min. : 1.0

Solenoid valve, start of injection
 Connections 1 and 2
 Test temperature :
 15°...30°C, ohms : 14.3...17.3
 50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed 1/min : 750

Checkbk. volt.

mV : 3900

Setting value, bar : 6.0...7.0

Timing device travel:

Speed 1/min : 750

Checkbk. volt

mV : 3900

Setting value, mm : 8.5...8.7

Full-load delivery :

1st temperature-conditioning

revolution 1/min : 2000

Checkbk. volt

mV : 2500

Output

temperature °C : 61

Speed 1/min : 750

Checkbk. volt

mV : 2400

Measuring

temperature °C : 57

Fuel delivery cm³/

> 1000s : 36.4...36.8

Dispersion cm³/ : 2.5

> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000

Checkbk. volt

mV : 3790

Supply pump

pressure > bar : 7.4...8.4

> bar :

Timing device variations:

1st speed 1/min : 500

Checkbk. volt. mV : 3900

Timing device

travel mm : 6.6...9.0
> mm : (6.3...9.3)

2nd speed 1/min : 1750

Checkbk. volt. mV : 3670

Timing device

travel mm : 11.6...12.6
> mm : (11.5...12.7)

3rd speed 1/min : 1200

Checkbk. volt. mV : 1800

Timing device

travel mm : max. 0.3
> mm : (max. 2.5)

Solenoid valve

Start of

injection, volts : 12

4.th speed 1/min : 750

Checkbk. volt. mV : 3900

Timing device

travel mm :
> mm : (7.4...9.8)

Overflow at overflow valve:

1st temperature-conditioning

revolution 1/min : 100

Checkbk. volt. mV : 2500

Output

temperature °C : 51

Speed 1/min : 1750

Checkbk. volt. mV : 3670

Measuring

temperature °C : 53

Overflow : 97...181

> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 1750
Checkbk. volt mV : 3670
Meßtemperatur °C : 53
Fuel delivery cm³/ : 52.3...54.9
> 1000s : (51.6...55.6)
Dispersion cm³/ : 3.0
> 1000s. : (3.0)

2nd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2400
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (35.3...37.9)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 1000
Checkbk. volt mV : 3210
Measuring
temperature °C : 57
Fuel delivery cm³/ : 55.9...58.5
> 1000s : (55.2...59.2)
Dispersion cm³/ : 2.00
> 1000s : (2.5)

4th temperature-conditioning

revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2320
Measuring
temperature °C : 57
Fuel delivery cm³/ : 39.5...42.1
> 1000s : (38.8...42.8)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1520
Meßtemperatur °C : 57
Fuel delivery cm³/ : 6.9...10.9
> 1000s : (5.9...11.9)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2960
Measuring
temperature °C : 61
Fuel delivery cm³/ : 72.0...86.0
> 1000s : (69.0...91.0)

Solenoid valve

Start of
injection, volts : 12

Stop test:

Speed 1/min : 1000
Checkbk. volt mV : 2460
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 5.0

Speed 1/min : 1500
Checkbk. volt mV : 4100
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Solenoid valve

Start of
injection, volts : 12

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description

K	mm	:	2.7...2.9
KF	mm	:	8.2...8.6
SVS max.	mm	:	
FH	mm	:	
TS		:	1 467 010 495